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MMPI AND RORSCHACH FORM LEVEL SCORES IN A STUDENT POPULATION*

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A. INTRODUCTION

Martin Mayman (7) developed a system for scoring the "form-level" of Rorschach responses: that is, the degree to which a response adheres to the formal properties of the particular blot or blot area. The system has been adopted by a number of clinicians and has demonstrated its usefulness in many research efforts (1, 4, 5, 7, 8, 9, 12). Lohrenz and Gardner (6) demonstrated that the system is easily taught, and that a short period of training makes possible very good interscorer reliabilities. The scoring system comprises seven categories which represent varying degrees of reality adherence. The $F+$ score is reserved for those responses which maximize the fit between the blot outline and the associated idea. The Fo score is for those responses that are considered popular (seen by at least half of any normal group), near-popular (seen by about one-third of normal subjects), or commonplace (found in one out of every five or six protocols). The Fw responses ($Fw+$ and $Fw-$) are less well grounded in the objective properties of the blot. The $Fw+$ score indicates that the response is unconvincing but not arbitrary, having no aspect that clashes with the associated idea. The $Fw-$, on the other hand, is assigned when the blot area offers only marginal support for the response. The Fv score more specifically reflects the choice of the image that is fitted to the blot, in the sense that the idea is of something that is intrinsically variable in shape (e.g., clouds, islands). The Fs (spoiled) and $F-$ responses are more serious departures from the reality of the stimuli than are involved in the weak Fw and the noncommittal Fv. The Fs score is given to a response which is almost an Fo or an $F+$, with some striking distortion or oversight, and the $F-$ response is one which seems to have virtual disregard for the structural properties of the blot. One of these seven scores is given to each test response that has form as its sole determinant, and to each which is principally, though not exclusively, determined by form.

In an unpublished study reported by Mayman (7), Holt, using 50 non-

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patient subjects, found that the percentage of "high" form-level scores (*F*+ and *Fo*) was correlated .30 ($p < .05$) with the Hypochondriasis scale of the MMPI and .35 ($p < .05$) with the Hysteria scale. He also found that the percentage of "low" form-level scores (*Fs, Fv, F*—) were negatively correlated with these same scales, respectively, —.37 ($p < .01$) and —.28 ($p < .05$). This finding is of particular interest, since it involves variations in personality dimensions within the normal range. The present study is to determine whether the same or other correlations may be found using a group of college students, employing both the same and a more liberal criterion for "high" form-level. Also of interest is the relationship between form-level scores and other aspects of the Rorschach test performance, and the distribution of the form-level scores in a nonpsychiatric population.

B. METHOD

Twelve white male college students, all paid volunteers, took the Rorschach test and the MMPI, with less than four months elapsing between the administration of the two tests. The *S*s' ages ranged from 20 to 23 years. The Rorschachs were administered by the first author, in the manner recommended by Rapaport, Gill, and Schafer (10). In assigning form-level scores, each test response was carefully checked against the scoring standards set forth in the scoring manual. The quantitative treatment of form-level scores may be done in a number of ways. Using each of the seven categories is one possibility, as is dividing the categories into groups of high and low form-level. In the study described above, Holt treated the percentage of *F*+ and *Fo* scores as high form-level, and the percentage of *Fs*, *Fv*, and *F*— scores as low form-level, thus omitting the weak *Fw*+ and *Fw*— scores. In the present study, we chose to use two criteria of good form-level: the percentage of *F*+ and *Fo* responses, which we call the *F*+%, and the percentage of *F*+, *Fo*, and *Fw*+ responses, which we call the extended *F*+ percent. Our *F*+ percent is thus comparable to the criterion for high form-level used by Holt. The MMPI answer sheets were processed by the computerized system at the University of Alabama (3).[1] Pearson product-moment correlations between the two form-level scores and other aspects of the Rorschach test performance, and between the form-level scores and 40 MMPI scales were then computed.

C. RESULTS

It should be noted that form-level scores can be based on the percentage of responses which have form as their sole determinant, and also on the percentage of responses which are principally, though perhaps not exclusively, determined by form. We shall speak of these two possible types of form-level scores, respectively, as form determined and form dominated. Responses which are primarily determined by qualities other than form (e.g., color or shading) are not assigned form-level scores and are not used in determining form-level percentages. Thus the form-level percentages of form determined responses are the ratios of the number of form determined responses in each category to the total number of form determined responses. Similarly, the form-level percentages of form dominated responses are the ratios of form dominated responses in each category to the total number of form dominated responses. The distribution of form-level scores is presented in Table 1. These average percentages are based on the proportion of form dominated responses in each scoring category to the total number of form dominated responses. The total number of responses in the 12 protocols ranged from 23 to 48, with a mean of 34.

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[1] The authors would like to thank R. D. Fowler, Jr. for his cooperation in the data analysis.

TABLE 1
AVERAGE PERCENTAGE OF SCORES IN EACH CATEGORY

Form level	Percentage
$F+$	16.7%
Fo	22.4%
$Fw+$	32.4%
$Fw-$	21.5%
Fv	2.8%
Fs	.9%
$F-$	3.1%

A negative correlation was found between the total number of Rorschach test responses and the extended $F+$ percent when based on either form determined or form dominated responses ($p < .05$). The only significant correlation found between form-level and MMPI scales was between the extended $F+$ percent of form dominated responses and the Pd-S scale (subtle psychopathic deviate) ($p < .05$). Description and references relevant to this MMPI scale may be found in the Dahlstrom and Welsh *Handbook* (2).

D. DISCUSSION

The finding of an inverse relationship obtaining between the percentage of responses having high form-level and the total number of responses suggests that inferences should not be drawn from form-level scores without consideration of the context within which they occur. It is far easier to earn high form-level scores in an abbreviated test record than it is in a lengthy one, so interpretations of the scores must be tempered accordingly. Also, with regard to the use of any one form-level score it should be emphasized that the seven scoring categories do not represent a continuum from very good to very poor. Rather, as Mayman (7, p. 5) points out, they are "qualitatively distinct modes of reality testing," and cannot legitimately be averaged or otherwise condensed into a single score. The $F+$ percent and the extended $F+$ percent were used in this study because they provide two levels of measurement of the *S*'s adherence to the formal characteristics of the blots. With the $F+$ percent an index is obtained of the proportion of high form-level percepts ($F+$ and Fo) to those of weak or poor form-level ($Fw+$, $Fw-$, Fv, Fs, $F-$). The extended $F+$ percent provides a less stringent criterion for "high" form-level, since it includes the weak but still defensible $Fw+$ responses. The use of these two measures, then, is one approach to the quantitative use of the scoring system, though it admittedly sacrifices some of the value of having seven discrete categories.

The Pd-S scale was devised to be a subtle version of the Pd scale, an attempt to assess the same personality variables, but as they might be manifested within the normal range of behavior (11). Thus, variations on the Pd-S scale could be said to reflect relatively mild degrees of such characteristics as rebelliousness, lack of depth in interpersonal relationships, etc. The positive correlation found between form-level and the Pd-S scale in this group of college students seems most understandable in terms of the attitude taken toward the Rorschach testing. A reluctance to "go out on a limb," to freely engage in the task, or to risk any self-disclosure might lead to a high form-level percentage through a consequent tendency to restrict the Rorschach responses to easily seen, "obvious" percepts. Finding only this correlation between form-level scores and a "subtle" MMPI scale is consistent with the failure to replicate Holt's findings in this relatively small group of college students. It would seem that Rorschach form-level scores are not related to most MMPI variables within a relatively homogeneous nonpatient group.

E. Summary

Rorschach and MMPI records were obtained from 12 male college students. Correlations found elsewhere between Mayman's Rorschach form-level scores and certain MMPI scales did not appear, though one other such correlation was found. A significant relationship was found between form-level and the total number of responses on the Rorschach, and the distribution of the seven types of scores in the Rorschachs of a nonpatient population was obtained. Issues relevant to the interpretation and the quantitative treatment of form-level scores are discussed.

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FACTORIAL STUDY OF INTELLECTIVE SELF-RATINGS BY MALE AND FEMALE SUBJECTS*

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A. Introduction

Sciortino's (5) recent factor analysis of the scores of a combined sample of male and female undergraduate *S*s on an Intellective Adjective List (IAL) yielded five factors: ingenuity, meditativity, curiosity, alertness, and flexibility. Moreover, a simple analysis of factor variance performed on these factors yielded the following results. The male *S*s rated themselves significantly higher than the female *S*s on factor ingenuity; however, the female *S*s rated themselves significantly higher than the male *S*s on factors curiosity, alertness, and flexibility. No significant sex difference was found for factor meditativity.

The purpose of this study was to find the factorial structure of IAL for a male and female sample of undergraduate *S*s respectively. Several factorial methods were used and the one that most adequately met the criteria of simple structure was chosen for the interpretation of factors.

B. Method

A male ($N = 100$) and a female sample ($N = 102$) of undergraduate students were administered the IAL which consists of the 40 items listed in Table 1. The samples, the IAL, and the test administration procedures were described by Sciortino (5). The findings reported here are based on the two separate groups.

C. Results

1. *Computations*

The computations for this study were carried out on the IBM 7094 operated by the Princeton Computer Center and with the P-Stat computer program. For each sample the iterative factor analysis routine of the P-Stat computer program, described in Sciortino (5), was used to perform a factor

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TABLE 1
MATRIX OF MEANS AND STANDARD DEVIATIONS FOR SCORES ON THE INTELLECTIVE ADJECTIVE LIST (IAL)
Males ($N = 100$) Females ($N = 102$)

Variables	Males		Females	
	M	*SD*	*M*	*SD*
1. Questing	3.26	.82	3.26	.78
2. Observant	3.60	.79	3.84	.90
3. Interests-wide	3.34	1.00	3.85	.96
4. Explorative	3.45	.82	3.19	.91
5. Curious	3.69	.73	3.82	.87
6. Questioning	3.37	.87	3.48	.90
7. Open-minded	3.74	.72	3.98	.84
8. Likes-challenges	3.54	.72	3.70	.90
9. Inquiring	3.36	.79	3.48	.88
10. Eager	3.44	.69	3.76	.77
11. Intelligent	3.24	.49	3.28	.64
12. Foresightful	3.02	.93	3.38	.90
13. Clear-thinking	3.25	.73	3.19	.67
14. Capable	3.50	.69	3.70	.69
15. Alert	3.45	.59	3.55	.67
16. Keen	3.11	.57	3.25	.71
17. Insightful	3.22	.68	3.33	.81
18. Flexible	3.44	.62	3.74	.88
19. Clever	3.07	.67	3.09	.73
20. Astute	2.88	.71	2.79	.95
21. Productive	3.18	.69	3.21	.74
22. Inventive	2.70	1.09	2.67	1.06
23. Ingenious	2.62	.91	2.47	.91
24. Imaginative	3.31	.87	3.36	1.06
25. Adroit	3.01	.64	2.82	.74
26. Resourceful	3.22	.60	3.27	.79
27. Original	3.06	.76	3.10	.90
28. Innovative	3.03	.69	2.95	.72
29. Improvisive	3.24	.73	3.33	.75
30. Fertile-mind	3.18	.64	3.18	.88
31. Studious	3.00	.77	3.17	.94
32. Reflective	3.23	.91	3.57	.86
33. Pensive	3.07	1.01	3.15	1.05
34. Ideational	3.17	.99	3.12	1.10
35. Academic	2.91	.88	2.77	1.03
36. Theoretical	2.93	.95	2.73	1.03
37. Scholarly	2.86	.83	2.94	.94
38. Meditative	3.22	.85	3.44	.92
39. Introspective	3.33	.82	3.41	.97
40. Esthetic	3.18	1.01	3.68	.94

analysis on the matrix of item correlations and a matrix of initial significant factors was obtained. Then, three orthogonal rotations were performed on the matrix of initial significant factors of each sample with the use of the quartimax (3), the varimax (2), and the equamax (4) procedures. Moreover, three promax rotations (1), with $k = 4$, were performed on the orthogonal rotations of each sample obtaining the promax-quartimax, the promax-varimax, and the promax-equamax solutions. The matrices obtained from these factorial procedures are in the NAPS materials.[1]

For both samples, Table 1 shows the means and standard deviations of the IAL items and Table 2 shows the matrix of promax-equamax factors. Table 3 shows the correlation matrix of the promax-equamax factors for the male sample, and Table 4 shows the correlation matrix of the promax-equamax factors for the female sample.

2. *Interpretation of Males' Factors*

Interpretation of factors is based on the results obtained from the promax-equamax solution, shown in Table 2, and rests on loadings of .26 or greater ($p = .01$, if $N = 100$). A factor whenever possible was assigned the name of the variable that has the highest loading with it.

Factor A (Inventiveness) has loadings arranged as follows: inventive, .61; innovative, .59; original, .53; adroit, .53; ingenious, .52; improvisive, .48; clever, .43; observant, .43; esthetic, .39; insightful, .34; imaginative, .32; and explorative, .28. This factor refers to *S*s' ability to solve problems in a skillful and novel manner.

Factor B (Meditativity) has loadings arranged as follows: meditative, .67; pensive, .51; introspective, .42; academic, .42; reflective, .41; intelligent, .37; theoretical, .35; ideational, .35; insightful, .30; open-minded, .27; and alert, —.27. This factor refers to *S*s' ability to reflect about ideas.

Factor C (Curiosity) has loadings arranged as follows: curious, .66; questioning, .58; inquiring, .54; questing, .41; reflective, .33; and explorative, .30. This factor refers to *S*s' readiness to find out about things or to be informed.

Factor D (Shrewdness) has loadings arranged as follows: alert, .55; keen, .43; astute, .42; clever, .41; fertile-mind, .40; foresightful, .36; clear-thinking, .34; resourceful, .30; and adroit, .26. This factor refers to *S*s' ability to size up situations in a crafty manner.

Factor E (Eagerness) has loadings arranged as follows: eager, .64; scholarly, .57; studious, .46; productive, .41; questing, .33; and imaginative, —.27.

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[1] The following materials have been deposited with the National Auxiliary Publication Service: Tables A through D contain materials for both male and female samples. Table A, matrix of item correlations (40 × 40) of the IAL; Table B, matrix of initial significant factors and equamax factors; Table C matrix of quartimax and varimax factors; Table D matrix of promax-quartimax and promax-varimax factors; Table E correlation matrix of promax-quartimax and promax-varimax factors for the male sample; and Table F correlation matrix of promax-quartimax and promax-varimax factors for the female sample. Order Document No. 00523 from ASIS National Auxiliary Publication Service, c/o CCM Information Sciences, Inc., 22 West 34th St., New York, New York, 10001. Remit in advance $3.00 for photocopies or $1.00 for microfiche.

TABLE 3
CORRELATION MATRIX OF PROMAX-EQUAMAX FACTORS FOR SCORES ON THE INTELLECTIVE ADJECTIVE LIST (IAL)
Males ($N = 100$)

	Promax-Equamax factors				
Factors	A	B	C	D	E
Inventiveness (A)		45*	29*	38*	14
Meditativity (B)			31*	53*	20
Curiosity (C)				37*	36*
Shrewdness (D)					19
Eagerness (E)					

Note: Decimal points omitted.
* $p < .01$.

TABLE 4
CORRELATION MATRIX OF PROMAX-EQUAMAX FACTORS FOR SCORES ON THE INTELLECTIVE ADJECTIVE LIST (IAL)
Females ($N = 102$)

	Promax-Equamax factors						
Factors	A	B	C	D	E	F	G
Ingenuity (A)		43*	38*	49*	41*	54*	41*
Speculativity (B)			37*	38*	26*	33*	36*
Curiosity (C)				20	22	21	41*
Flexibility (D)					41*	59*	31*
Pensivity (E)						43*	25*
Capability (F)							32*
Scholarship (G)							

Note: Decimal points omitted.
* $p < .01$.

This factor refers to *S*s' enthusiasm for scholastic matters. However, the low negative loading of the item imaginative indicates that *S*s' involvement is marked by a rather unimaginative productivity.

3. *Interpretations of Females' Factors*

Interpretation of factors is based on the results obtained from the promax-equamax solution, shown in Table 2, and rests on loadings of .25 or greater ($p = .01$, if $N = 102$). A factor whenever possible was assigned the name of the variable that has the highest loading with it.

Factor A (Ingenuity) has loadings arranged as follows: ingenious, .70; clever, .64; adroit, .48; inventive, .38; studious, —.34; keen, .32; imaginative, .31; resourceful, .30; original, .28; and innovative, .25. This factor refers to *S*s' ability to solve problems in a clever manner. However, the negative loading of the item studious indicates a certain lack of diligence on the part of the *S*s.

Factor B (Speculativity) has loadings arranged as follows: theoretical, .64; insightful, .44; open-minded, .43; meditative, .41; explorative, .39; academic, .34; scholarly, .25; and fertile-minded, .25. This factor refers to *S*s' ability to meditate on a subject from a theoretical point of view.

Factor C (Curiosity) has loadings arranged as follows: curious, .66; inquiring, .66; questioning, .52; questing, .45; explorative, .32; and likes-challenges, .29. This factor refers to *S*s' readiness to find out about things or to be informed.

Factor D (Flexibility) has loadings arranged as follows: flexible, .62; foresightful, .55; insightful, .33; academic, —.33; theoretical, —.33; likes-challenges, .31; meditative, .27; and introspective, .27. This factor refers to *S*s' ability to adapt themselves to situations. However, the negative loadings of the items academic and theoretical indicate that *S*s' flexibility is not directed toward purely theoretical matters but rather toward behavioral situations.

Factor E (Pensivity) has loadings arranged as follows: pensive, .54; fertile-mind, .46; introspective, .41; reflective, .40; astute, .38; meditative, .31; inventive, .28; and theoretical, .27. This factor refers to *S*s' ability to ponder ideas.

Factor F (Capability) has loadings arranged as follows: capable, .69; eager, .55; alert, .43; and keen, .26. This factor refers to *S*s' ability to cope with situations.

Factor G (Scholarship) has loadings arranged as follows: scholarly, .69; studious, .52; academic, .48; intelligent, .25; and questing, .25. This factor refers to *S*s' interest in scholastic matters.

D. Discussion and Conclusion

The correlations of the males' promax-equamax factors, as shown in Table 3, range from .14 to .53 and indicate that the five factors of inventiveness, meditativity, curiosity, shrewdness, and eagerness share a certain degree of variance. However, with the exception of factor curiosity, none of the factors incorrelated significantly with factor eagerness. This indicates that factors inventiveness, meditativity, and shrewdness can be effectively manifested in an atmosphere of moderate enthusiasm. The five factors refer to *S*s' ability to solve problems in a skillful and novel manner, to reflect about ideas, readiness to find out about things, ability to size up situations in a crafty manner, and enthusiasm for scholastic matters.

The correlations of the females' promax-equamax factors, as shown in Table 4, range from .20 to .59 and indicate that the seven factors of ingenuity, speculativity, curiosity, flexibility, pensivity, capability, and scholarship share a certain amount of variance. However, factor curiosity does not correlate significantly with factors flexibility, pensivity, and capability. This indicates that factors flexibility, pensivity, and capability can be effectively shown in an atmosphere of moderate curiosity. The seven factors refer to *S*s' ability to solve problems in a clever manner, ability to meditate on a subject, readiness to find out about things, ability to adapt to situations, ability to ponder ideas, ability to cope with situations, and interest in scholastic matters.

The results reported here indicate that, under the conditions of this investigation, the factorial structures of the IAL items reflect sex differences. The influence of sex has been observed in the number of factors extracted—five for the male and seven for the female sample—as well as in the item composition and item loadings of the respective factors of the two samples. Moreover, although the five factors—ingenuity, meditativity, curiosity, alertness, and adaptability—extracted from the combined sample (5) have more generality than the seven factors obtained from the female sample, they are rather similar to the five factors obtained from the male sample.

These three analyses—the present one for the male and female samples respectively, and the recent one with the combined sample Sciortino (5)—suggest that, if one is interested in obtaining factors of a general nature, a factorial study in which both male and female samples are combined is indicated. However, if one prefers factors that better describe the characteristic intellective pattern of either sex a separate factorial study, for either sex, is appropriate.

E. SUMMARY

Two separate iterative factor analyses, performed on the scores of an Intellective Adjective List (IAL) by a male sample ($N = 100$) and a female sample ($N = 102$), yielded two matrices of initial significant factors. For each sample, the initial matrix of significant factors was rotated according to the quartimax, varimax, and equamax procedures. Then, the promax rotation was performed on the orthogonal solutions of each sample obtaining the promax-quartimax, the promax-varimax, and the promax-equamax solutions. Interpretation of factors was based on the promax-equamax solutions of each sample. The factors obtained with the male sample were, inventiveness, meditativity, curiosity, shrewdness, and eagerness. The factors obtained with the female sample were, ingenuity, speculativity, curiosity, flexibility, pensivity, capability, and scholarship.

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FIXED AND VARIABLE DURATION WARNING STIMULI AND CONDITIONED SUPPRESSION* [1]

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A. INTRODUCTION

Recent experimental literature indicates that *S*s prefer a condition in which some stimulus reliably precedes aversive shock to a comparable condition involving unsignalled shock (e.g., 5, 6, and 9). The present experiment extends the investigation of this "warning" phenomenon by manipulating the variability of the duration of a warning stimulus, rather than its presence or absence. The research employs the conditioned suppression paradigm first demonstrated by Estes and Skinner (3), in which a warning stimulus followed by an unavoidable aversive shock is superimposed upon a positively reinforced operant baseline.

It was expected that the use of a temporally unreliable warning stimulus would result in greater suppression of operant behavior and a greater resistance to extinction of this conditioned suppression than would the use of a comparable warning stimulus of fixed duration.

B. EXPERIMENT I

1. *Method*

a. Subjects. Eight naive male rats of the Sprague-Dawley strain, between 90-120 days old at the start of training were used. All animals weighed between 240 and 300 grams and were maintained at approximately 80 percent of their preexperimental weights. Water was continuously available in the home cage.

b. Apparatus. A retractable lever was mounted on the left side of the front wall of a Plexiglas experimental chamber with dimensions 12 × 12 × 9 inches high. Forty-five mg Noyes pellets could be delivered into a food tray

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located at the center of the front wall. The floor of the chamber contained 20 brass rods, each ⅛ inch in diameter and mounted ½ inch apart. Grids were wired to a Grason Stadler constant current shock generator and scrambler (Model E1064 GS) calibrated to deliver .8 ma shock for two seconds. Each shock was preceded by a 1250-cps tone at 98 db./.0002 dynes/cm^2 from a speaker in the rear cage wall. White noise at 81 db. was continuously present in the experimental room. Illumination was provided by a 60-watt bulb located approximately five feet above the cage.

c. Pretraining. Following a one week adaptation to the deprivation schedule, *S*s were magazine trained and shaped to press the lever. Following a session of 100 reinforcements on a continuous reinforcement (CRF) schedule, responses were reinforced on a variable interval (VI) 15-second (range = 3-45 seconds) schedule for three 30-minute sessions. The reinforcement schedule was then changed to VI 30-seconds (range = 6-90 seconds) for the remainder of the experiment. After thirty 30-minute sessions (six per week), visual inspection of cumulative response records revealed that all animals had achieved stable response rates, and *S*s were randomly divided into two experimental groups.

To allow for adaptation to the warning stimulus, the 1250 cps tone was introduced three times during each of the following three sessions. For Group A, tone duration equalled 30 seconds. For Group B, tone durations were randomly varied between five and 55 seconds (in five-second divisions), but the average duration remained at 30 seconds in each session. Identical intertone intervals were used for both groups but changed daily. By the third adaptation session, no appreciable change (suppression or acceleration) appeared in baseline response rate during the tones.

d. Training. For both groups, shock calibrated at .8 ma was introduced immediately following offset of each tone during the next 18 sessions. Following these 18 conditioning sessions, subjects were run for 12 extinction sessions during which CS presentations were continued but shock was withheld. A suppression ratio was computed for each session by dividing the total number of responses made during the three CS's in each session by the summed mean number of responses made during the two 30-second periods immediately prior to each CS. The use of two pre-CS periods in the ratio denominator was prompted by differences in VI schedule density which might affect response rate. Ratios ranging from zero to .99 indicate decreasing amounts of suppression; a ratio of 1.00 indicates equivalent responding during CS and pre-CS periods.

2. *Results*

As shown in Table 1, *S*s in the variable duration group (Group B) showed significantly greater response suppression during the final 12 conditioning sessions than *S*s in the fixed duration group (Group A) ($t = 4.08$; $df = 6$; $p < .01$, two-tailed test). This difference between groups remained significant during the 12 extinction sessions which followed ($t = 2.77$; $df = 6$; $p < .05$; two-tailed test).

TABLE 1
SUPPRESSION RATIOS FOR FOUR *S*s IN GROUPS A AND B

Experimental condition	Group A (Fixed duration CS)	Group B (Variable duration CS)
	Experiment I	
12 Conditioning Sessions US = .8 ma	$\overline{X} = .072$	$\overline{X} = .031$
12 Extinction Sessions	$\overline{X} = .534$	$\overline{X} = .268$
	Experiment II	
12 Conditioning Sessions US = .4 ma	$\overline{X} = .056$	$\overline{X} = .048$
12 Extinction Sessions	$\overline{X} = .489$	$\overline{X} = .466$
12 Conditioning Sessions US = .8 ma	$\overline{X} = .027$	$\overline{X} = .006$
12 Extinction Sessions	$\overline{X} = .483$	$\overline{X} = .201$

C. EXPERIMENT II

Previous parametric work has demonstrated that conditioned suppression may be related to the intensity of the unconditioned stimulus (1, 4). The purpose of Experiment II was to determine if the differences found between the fixed and variable duration groups in Experiment I were independent of the intensity of the unconditioned stimulus. In addition, response distributions during the CS were recorded in order to uncover possible bases for the differential suppressive effects of the two warning stimulus conditions.

1. *Method*

a. Subjects. Eight male Sprague-Dawley rats of similar weights and ages to those used in Experiment I served as subjects.

b. Procedure. The same number and sequence of experimental sessions as in Experiment I were conducted with shock intensity set at .4 ma. Following the extinction sessions, during which shocks were withheld, all animals were run for ten VI 30-second sessions with no tone or shock presented. Following these ten sessions, the CS alone was presented three times during each of three consecutive sessions. At the end of the 13 sessions, when baseline responding appeared to be stable throughout the presence of the tone, 18 conditioning sessions with shock intensity calibrated to .8 ma were conducted. Twelve extinction sessions (shock withheld) followed conditioning. Throughout conditioning sessions at both shock intensities, response frequencies were printed out for each five seconds of CS presentation.

2. *Results*

An analysis of variance of the results obtained in Experiment II revealed a significant difference between the fixed and variable CS duration conditions ($F = 8.74$; $df = 1/6$; $p < .05$). Although the intensity of shock appeared somewhat related to the difference between group suppression ratios, the main effect of this variable did not reach statistical significance ($F = 4.67$; $df = 1/6$; $.10 > p > .05$). There was, however, a significant interaction between these two main effects ($F = 7.23$; $df = 1/6$; $p < .05$). Individual compari-

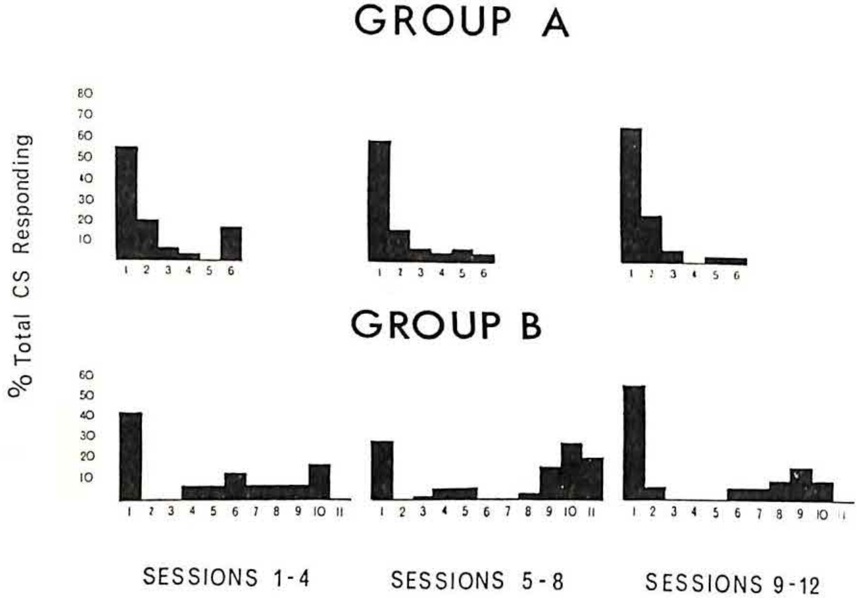

FIGURE 1
TEMPORAL DISTRIBUTIONS OF RESPONDING WITHIN THE CS
DURING FINAL 12 CONDITIONING SESSIONS

Data are divided into three blocks of four sessions each. The proportion of responses occurring during each five-second period of the CS prior to .4 ma shock is expressed in each histogram.

sons of the extinction data for Groups A and B revealed a significant difference in suppression ratios during this period only at the higher of the two shock intensities ($t = 2.60$; $df = 6$; $p < .05$). See Table 1.

The results of the analysis of within-CS responding during the final 12 conditioning sessions are reported below. Figure 1 illustrates the temporal distribution of each group's responding during the CS preceding .4 ma shock, and Figure 2 provides comparable information under the .8 ma shock conditions. With increased exposure under both shock intensity conditions, the fixed duration CS resulted in greater responding during the early portion of the warning interval than did the temporally variable CS. This property of the fixed duration CS was more prominent under the stronger (.8 ma) of the two shock intensities.

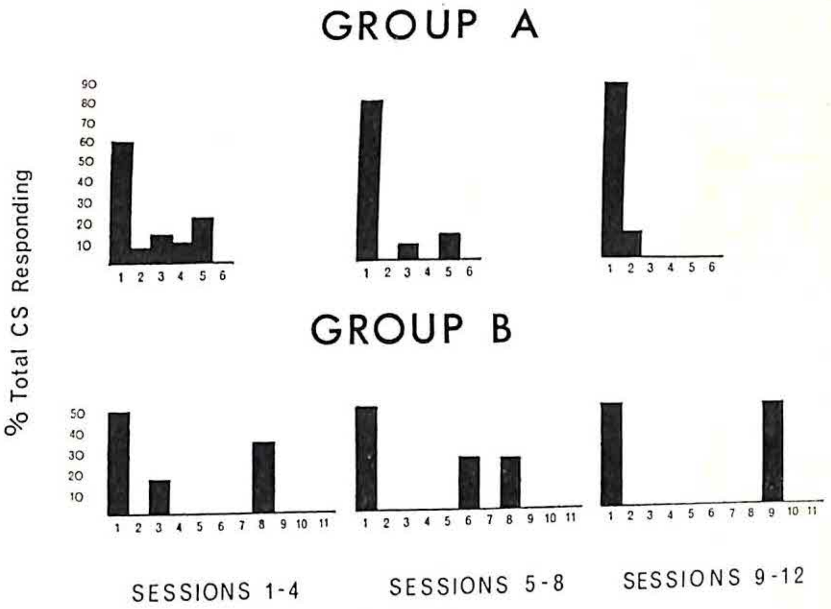

FIGURE 2
Temporal Distributions of Responding Within the CS
During Final 12 Conditioning Sessions

Data are divided into three blocks of four sessions each. The proportion of responses occurring during each five-second period of the CS prior to .8 ma shock is expressed in each histogram.

D. Discussion

These experiments have demonstrated that a variable duration warning stimulus results in greater conditioned suppression of bar-pressing than does a CS of fixed duration equal to the mean of the distribution of variable durations. Moreover, this effect appears to be partially dependent on the intensity of the suppressive shock. The reported greater resistance to extinction under a variable duration CS condition has been demonstrated by other investigators. Low and Low (7) reported significantly more trials taken to reach an extinction criterion for *S*s exposed to a variable duration CS in a discriminated avoidance experiment, and Bersh, Schoenfeld, and Notterman (2) found significantly greater resistance to extinction for human *S*s exposed to a variable duration CS in the classical conditioning of a cardiac response.

The analysis of responding during the CS in the present experiment suggests that difficulty in forming a temporal discrimination and thereby defining a "safe period" for responding, evidenced by the extent of responding during the "safe" early part of the CS interval, is a critical difference between fixed and variable duration CS conditions. This interpretation is consistent with the Pavlovian notion of inhibition of delay (8). With the development of a temporal discrimination by Group A, respondents traditionally inferred to be incompatible with bar-pressing (e.g., 3) were inhibited early in the CS. As the CS continued, however, inhibition decreased and these suppressive respondents were elicited due to proximity of US onset. In Group B, because of the unreliable temporal relationship between CS and presentations of the US, *S*s were less able to discriminate a "safe period" during the CS and greater suppression was recorded.

Under the fixed-duration condition, a weaker temporal discrimination accompanied reduced conditioned suppression at the lower shock intensity. Moreover, under the fixed-duration condition, the relationship between conditioned suppression and shock intensity appeared nearly linear as two-fold increases in one produced approximately two-fold increases in the other. In the absence of such a temporal discrimination under the variable duration CS condition, a two-fold increase in shock produced an eight-fold increase in conditioned suppression. Such a result implies the need for specifying the nature of the temporal relationship between CS and US before elaborating the relationship between US intensity and conditioned suppression.

In this series of experiments, a temporal discrimination within the warning stimulus was most evident under the fixed duration condition with the use of the higher intensity shock. At the lower shock intensity, differences in temporal discrimination between experimental conditions were less evident. This implies that US intensity is related to the formation of within-CS temporal discriminations; furthermore, these discriminations appear to be a prerequisite for demonstrating differences in suppressive effects due to variability in the warning stimulus.

E. SUMMARY

Sprague-Dawley rats were trained on a conditioned suppression procedure with either a fixed duration (30 second) or a variable duration ($\overline{X} = 30$ seconds, range = 5-55 seconds) warning stimulus. In Experiment I, with shock intensity = .8 ma, the variable duration CS resulted in significantly greater suppression of bar-pressing and resistance to extinction of suppression. In Experiment II, with shock intensity first decreased to .4 ma, and then restored to .8 ma, a significant difference was reported between experimental groups, whereas the main effect of shock intensity approached, but did not reach significance. There was a significant interaction between these two main effects. A temporal analysis of within-CS responding revealed a greater clustering of responses within the early part of the warning interval under the fixed duration CS condition. It is concluded that the temporal patterning of within-CS responding underlies the obtained differences in conditioned suppression, and that US intensity is related to such temporal properties of behavior.

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DIMENSIONS OF FACULTY-COURSE EVALUATION*

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A. INTRODUCTION

The problem of evaluating instruction is closely tied to identifying the purposes of the university, the goals it sets for itself, the objectives it sets for its students (3). Recently, Dwyer (6) reviewed the research related to characteristics and relationships of selected criteria for evaluating teacher effectiveness. It was evident that there is a paucity of information regarding the dimensionality of faculty-course evaluation instruments. Application of multivariate procedures has supported both simplistic and manifold models. The use of factor analysis has succeeded in isolating two factors, *instructor empathy* and *instructional competence* (2, 9). However, Dick (5), Dwyer (6), and Spencer (10) support a six-factor model consisting of *general course attitude, method of instruction, course content, student interest and attention, instructor characteristics,* and *specific procedures.* Specifically, the purpose of the study was twofold: (*a*) to investigate the structure of faculty-course evaluation, and (*b*) to aim for a model useful for the construction of faculty-course rating instruments.

B. METHOD

*S*s were 1097 students enrolled in 60 sections of an introductory speech-communication course at the University of Hawaii (11). Course sections were guided by 27 faculty members with various amounts of teaching experience. *S* evaluated both the "activity group" instructor, as well as course content and procedures.

Sixty-seven ratings were obtained for each *S* from two faculty-course evaluation instruments, the Illinois Course Evaluation Questionnaire (CEQ) (10) and A Student's Rating Scale of an Instructor.[1] The former consisted of 50 five-point ratings dealing with the "mechanics" of teaching and course management, while the latter consisted of 17 nine-point ratings focused on attributes of the instructor.

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[1] Published by Prof. Russell M. Eidsmoe, Department of Education, Morningside College, Sioux City, Iowa.

Scores for each S were intercorrelated and the resultant matrix factor analyzed. An initial inspection of the eigenvalues indicated 11 factors with roots greater than 1.0. However, an application of the *scree test* (4) declared nine factors as a reasonable solution. Squared multiple R's were inserted in the principal diagonal as communality estimates and nine factors extracted. Orthogonal rotation was employed with the use of the Varimax procedure (7).

C. RESULTS[2]

1. *Major Dimensions*

First of all, it was clear from an inspection of the final rotated factor matrix that Factors 1 and 2 accounted for a substantial portion (64 percent) of the variance. The remaining seven factors contributed relatively small amounts (averaging 5 percent) to the final solution.

Factor 1 accounted for 38 percent of the rotated variance and was labeled "instructional impact." An inspection of the loading pattern indicated that the factor was marked by variables from the CEQ scale, notably, *the course was quite useful* (.85), *it was a worthwhile course* (.84), *course was not very helpful* (—.84), *not much was gained by taking this course* (—.81), *uninteresting course* (—.79), *it was quite interesting* (.76), *it was a waste of time* (—.74), *overall, the course was good* (.73), *the course material seemed worthwhile* (.73), *the content of the course was very good* (.72), *the course held my interest* (.70), *the course increased my general knowledge* (.69), *it was quite boring* (—.65), *I would take another course that was taught this way* (.63), *excellent course content* (.62), *held my attention throughout the course* (.58), *more courses should be taught this way* (.57), *t was difficult to remain attentive* (—.54), *one of my poorest courses* (—.51), *the textbook was very good* (.50), *it was easy to remain attentive* (.49), *I would have preferred another method of teaching in this course* (—.49), *generally, the course was well organized* (.48), *I think that the ourse was taught quite well* (.47), *another method of instruction should ave been employed* (—.47), *homework assignments were helpful in undertanding the course* (.44), *some days I was not very interested in this course* —.42), and *course material was poorly organized* (—.40).

Factor 2 accounted for 26 percent of the rotated variance and was labeled instructor impact." An inspection of the loading pattern indicated that the factor was marked primarily by variables from the Eidsmoe scale with four contributions from the CEQ. The markers were *usually keeps steady interest in subject and stimulates thinking* (.74), *creates real desire and keeps things moving* (.74), *keeps up steady interest and enthusiasm* (.71), *attitude of friendliness and feeling of mutual interest* (.70), *possesses keen sense of humor* (.69), *pleasant voice and speaks distinctly* (.68), *efficient management of classroom* (.67), *excellent mastery of subject matter* (.67), *encourages students to express opinions* (.66), *usually selects important ideas* (.65), *shows definite evidence of careful preparation* (.65), *students understand the tasks of each new assignment* (.63), *well poised and sure of himself* (.62), *questions challenging and demands sound thinking* (.61), *well organized and shows thorough planning* (.60), *neat and well groomed appearance* (.55), *the instructor seemed to be interested in students as persons* (.42), *the instructor seemed to consider teaching as a chore or routine activity* (—.42), *the instructor did not synthesize, integrate or summarize effectively* (—.39), *the instructor has a thorough knowledge of his subject matter* (.38), and *examination questions thought-provoking and carefully selected* (.36).

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[2] A detailed tabulation of the results may be obtained as Document NAPS 00522, om ASIS National Auxiliary Publications Service, c/o CCM Information Sciences, c., 22 West 34th Street, New York, N.Y. 10001, remitting $1.00 for microfiche or .00 for photocopies.

2. *Minor Dimensions*

The remaining factors identified in the study were small and centered about the CEQ.

Factor 3 accounted for 7 percent of the rotated variance and was labeled "difficulty level." An inspection of the loading pattern indicated that the factor was marked by *the course material was too difficult* (—.65), *material in the course was easy to follow* (.59), *at times I was confused* (—.58), *ideas and concepts were developed too rapidly* (—.55), *some things were not explained very well* (—.38), and *the content of the course was too elementary* (.36).

Factor 4 accounted for 6 percent of the rotated variance and was labeled "attention value." An inspection of the loading pattern indicated that the factor was marked by *it was easy to remain attentive* (.59), *it was difficult to remain attentive* (—.56), *held my attention throughout the course* (.48), *some days I was not very interested in this course* (—.38), *it was quite boring* (—.38), and *the course held my interest* (.35).

Factor 5 accounted for 8 percent of the rotated variance and was labeled "satisfaction with instructional method." An inspection of the loading pattern indicated that the factor was marked by *I would prefer a different method of instruction* (—.68), *another method of instruction should have been employed* (—.67), *I would have preferred another method of teaching in this course*

(—.60), *more courses should be taught this way* (.48), *I learn more when other teaching methods are used* (—.48), *I would take another course that was taught this way* (.44), and *the way in which this course was taught results in better student learning* (.42).

Factor 6 accounted for 6 percent of the rotated variance and was labeled "instructor commitment." An inspection of the loading pattern indicated that the factor was marked by *the instructor did not synthesize, integrate or summarize effectively* (—.47), *the instructor seemed to be interested in students as persons* (.45), *the instructor encouraged the development of new viewpoints and appreciations* (.43), *the instructor had a thorough knowledge of his subject matter* (.40), *the instructor did not review promptly and in such a way that students could understand their weaknesses* (—.39), *the demands of the students were not considered by the instructor* (—.39), and *the instructor seemed to consider teaching as a chore or routine activity* (—.39).

Factor 7 accounted for 3 percent of the rotated variance and was labeled "appropriate evaluation." An inspection of the loading pattern indicated that the factor was marked by *the types of test questions used were good* (.54), *the examinations were too difficult* (—.40), *the textbook was very good* (.35), and *examination questions thought-provoking and carefully selected* (.34).

Factor 8 accounted for only 2 percent of the rotated variance. Since there were no loadings over ±.35, the factor was left unidentified.

Factor 9 accounted for 4 percent of the rotated variance and was not labeled, since it was subsumed under Factor 1. However, an inspection of the loading pattern indicated that the factor was marked by *course material was poorly organized* (—.54), *generally, the course was well organized* (.45), and *the pace of the course was too slow* (—.36).

D. Discussion

One important application of the multivariate tool of factor analysis is to partition complex concepts into smaller and, hopefully, more manageable "functional unities." When applied to the complex concept of faculty-course evaluation, the present study indicated clearly that two major ingredients must be considered in the development of a meaningful taxonomy, namely, *instructor impact* and *instructional impact.*

The delineation of these two salient factors, however, does not imply that these entities completely describe the domain. A close inspection of various rating instruments currently used in academic settings clearly suggests a need for a class of variables associated with *effects on the learner*. There is increasing recognition that the measurement of unexpected or unpredictable outcomes in learning is one of the challenges of evaluation theory (8).

It is the contention of the present writer that faculty-course evaluation be embedded within a systems approach to higher education. As viewed here, evaluation is the process of identifying and quantifying the relationship between student inputs and educational outputs, along with a consideration of combination of mediating factors which maximize the outputs (1). Briefly, student inputs refer to the nature and characteristics of the students entering the course to be evaluated. Few faculty-course evaluation instruments consider the attributes of the learner.

Educational outputs refer to (*a*) cognitive and noncognitive changes which take place in students after they have been exposed to an instructional program, and (*b*) the impact of the program upon systems external to it (e.g., campus, home, community, other programs, etc.). Mediating factors refer to the description of the way in which resources are utilized with an instructional program in combination with the student inputs.

To state that faculty-course evaluation instruments should attend to *effect on the learner* is to affirm a systems approach to the problem. Future developments of faculty-course evaluation instruments must be sensitive to these sorts of measurable outcomes in higher education.

E. SUMMARY

The study attempted to establish the dimensionality of faculty-course evaluation. The Illinois Course Evaluation Questionnaire and A Student's Rating Scale of an Instructor was administered to 1097 students at the University of Hawaii. Sixty-seven variables were intercorrelated and factor analyzed, resulting in a nine factor solution. Two of the factors, labeled instructor impact and instructional impact, accounted for 64 percent of the rotated variance. The findings were discussed in light of a systems approach to evaluation in higher education.

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COMPARISON BETWEEN AMERICAN PERMANENT RESIDENTS OF ISRAEL: PART III, PREDICTIONS ABOUT AMERICA AND ISRAEL*[1]

B'nai B'rith Hillel Foundation at Purdue University

GERALD ENGEL

A. INTRODUCTION

In 1967, native American Jews who became permanent residents of Israel during the years 1962 through 1966 evaluated their American background and adjustment to Israel, and made predictions about the future of the Jew in America and Israel. Part I dealing with life in America, was presented as a comparison between the religious and nonreligious.[2] There was a general criticism of materialism; to a lesser degree both groups were troubled by anti-Semitism. However, the religiously oriented were more disturbed by assimilation and expressed greater interest in Israel than the nonreligious, who were more disturbed by conformity and witchhunting than the religious (2).

Part II focused upon the attraction of Israel and life in Israel. The religious were more attracted by Israel's Jewish factors than the nonreligious who found kibbutz (collective settlement) living more to their liking than the religious. However, Jewish aspects of Israel were of paramount importance to both groups. Similarity of age upon settling and shared feelings of ease upon arrival in Israel indicated similarity of dissonance. In 1967 both groups shared similar views about housing, living within Israeli income, and

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[1] The author gratefully acknowledges the aid of Dr. Harold Kahn, National Institute of Health, in preparing the questionnaire; of Dr. Ben Winer, Purdue University, for statistical analysis; Glenda McCracken and Arnold Woodruff, Purdue Computer Center, for programming. Marilyn Kopelowitz Engel served as study coordinator.

Special acknowledgment is made to B'nai B'rith Hillel Foundations for granting me a decennial leave to gather the data, November 1966 through August 1967, and to Dr. Frederick L. Hovde, President of Purdue University for allocating President's Funds for computer work; to Sarge Biltz, Inc., for funds for immediate publication.

[2] In Israel 255 subjects identified with Jewish religious tradition: 87 traditionalists (masorti); 30 keepers of commandments (shomer mitzvot); 138 observant (dati). One hundred eighty-eight were designated nonreligious in Israel: 27 against observance (anti-dati); 80 not observant (lo dati); 55 secularists (chiloni); 24 who wrote "don't know"; 2 Hebrew Christians.

work satisfaction, despite differences in occupation and disagreement about occupational prospects (3).

Part III presents the immigrants' views about the future of the Jew in America and Israel. Outwardly the situation of the American volunteer differs from olim (immigrants) who fled their homelands (1, 10, 11, 12). However, Americans come to reduce dissonance (4) ; they respond to inner signals of discontent (7).

Quantitative and qualitative differences exist between the religious and nonreligious in making predictions (8). Despite group differences, Americans in Israel reject the notion that the Jew in America is successfully adapting to a new social setting (6, 9). Since their arrival in Israel, Americans have become more concerned about the survival of the Jew in America, while simultaneously becoming more self-assured that Israel is the land of the future.

B. METHOD

1. *Subjects*

From an official list of permanent residents of Israel the names of 780 Americans born in the United States or Canada were selected, comprising all native Americans who became permanent residents of Israel during the years 1962 through 1966, and who were 20 years of age or older by the end of 1966. Seventy-seven subjects were eliminated, including six who said they left America as infants, six who were deceased, and 65 who were not in Israel from March through August 1967 when this questionnaire was administered. Of 703 potential subjects 443 cooperated, representing a 63 percent response.

2. *Procedure*

All subjects were mailed a four-page self-administering questionnaire. Respondents included 364 who voluntarily answered one of four mass mailings and 79 other subjects who were considered forced, responding to personal letter or interview. When few statistical differences were observed between these groups, the subjects were combined. The comparison presented between religiously oriented and nonreligious is based upon subjects' religious alignment in Israel, and does not necessarily reflect their religious outlook when in America (2).[3]

C. RESULTS

In comparing the responses of the religiously oriented and nonreligious no difference in age of arrival was observed (3). It was therefore hypothesized that both groups would project a similar dim view of the future of Jews in America. Results indicated the nonreligious became equally concerned about assimilation 79.9 percent of all respondents foresaw increasing assimilation, only 3.5 percent anticipated any decrease.

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[3] See footnote 2.

Religiously oriented subjects more than the nonreligious anticipated an increasing bond between Jews in America and world Jewry, 37.2 percent compared to 21.0 percent. However, more of the religious also predicted increasing anti-Semitism, 35.6 percent compared to 20.7 percent (chi square differences significant at the .005 level). The religiously oriented also expressed greater concern about church-state relations, 25.6 percent compared to 12.1 percent (chi square differences significant at the .01 level).

Simultaneously, nonreligious more than the religiously oriented visualized less contact between Jews in America and world Jewry, 32.3 percent compared to 26.9 percent; however, the nonreligious anticipated less anti-Semitism, 28.8 percent compared to 16.9 percent. Nonreligious also were less disturbed about church-state relations, anticipating decreasing concern about church-state relations, 22.3 percent compared to 18.6 percent.

The religiously oriented, more alarmed by the prospect of increasing anti-Semitism and church-state relations in America than the nonreligious, looked with greater favor upon their own children living in Israel, 93.7 percent compared to 74.9 percent. More of the religious also preferred having their children study in Israel, 88.1 percent compared to 68.4 percent. Religiously oriented subjects also were more readily in favor of having their children marry in Israel, 89.8 percent compared to 69.8 percent (chi square differences significant at the .001 level).

Group differences existed for four out of ten suggested factors which might influence Americans to remain in Israel (Table 1). Religiously oriented felt more strongly than nonreligious that more Americans stay because of Jewish atmosphere, religious environment, and the land's educational opportunities, ranked in that order. While nonreligious subjects agreed that living in a Jewish state was of paramount importance, the nonreligious felt more strongly than did the religious about the value of kibbutz (collective settlement) living in influencing more Americans to stay (Table 1).

When 13 factors were considered as possibly influencing Americans to either stay or leave, four significant group differences were observed (Table 2). The religiously oriented were more inclined than the nonreligious to maintain that more Americans will stay if they come with either money or friends and relatives. However, the nonreligious, more than the religious, felt more Americans who either marry a native (sabra) or join a collective set-

TABLE 1
REASONS FOR STAYING IN ISRAEL

	Percentages	
Question	Nonreligious (*N* 188)	Religiously oriented (*N* 255)
Treatment	(*N* 163)	(*N* 228)
none	38.7	43.4
some	41.1	38.6
much	20.2	18.0
Housing	(*N* 158)	(*N* 224)
none	39.9	45.1
some	31.6	28.1
much	28.5	26.8
Education	(*N* 157)	(*N* 222)*
none	35.7	23.4
some	40.1	45.9
much	24.2	30.6
Job opportunities	(*N* 160)	(*N* 222)
none	30.6	32.4
some	33.7	34.7
much	35.6	32.9
Religious environment	(*N* 157)	(*N* 232)****
none	24.8	9.9
some	55.4	37.9
much	19.7	52.2
Family health	(*N* 155)	(*N* 220)
none	35.5	31.4
some	47.1	44.5
much	17.4	24.1
Living in Jewish state	(*N* 164)	(*N* 236)***
none	8.5	4.7
some	28.7	17.4
much	62.8	78.0
Position in society	(*N* 155)	(*N* 223)
none	21.3	29.6
some	58.7	52.9
much	20.0	17.5
Kibbutz life	(*N* 157)**	(*N* 208)
none	33.8	42.3
some	42.0	46.2
much	24.2	11.5
Cultural life	(*N* 160)	(*N* 221)
none	18.8	16.3
some	44.4	49.3
much	36.9	34.4

Note: All tables derived from BMD02s—Contingency Table Analysis—Version of March 11, 1964, Health Sciences Computing Facility, UCLA.

* Chi square significant differences = .05.

** Chi square significant differences = .01.

*** Chi square significant differences = .005.

**** Chi square significant differences = .001.

TABLE 2
REASONS FOR STAYING OR LEAVING ISRAEL

Question	Percentages	
	Nonreligious (N 188)	Religiously oriented (N 255)
If Americans would:		
Arrive young,	(N 174)	(N 233)
they would leave	7.5	7.7
makes no difference	15.5	12.9
they would stay	77.0	79.4
Arrive with spouse,	(N 171)	(N 225)
they would leave	11.7	10.2
makes no difference	36.8	30.7
they would stay	51.5	59.1
Arrive with friends or relatives,	(N 169)	(N 226)*
they would leave	5.3	3.5
makes no difference	32.5	20.8
they would stay	62.1	75.7
Arrive with $20-40,000,	(N 169)	(N 233)**
they would leave	10.7	2.1
makes no difference	23.7	17.2
they would stay	65.7	80.7
Arrive after graduating technical or professional school,	(N 163)	(N 225)
they would leave	19.6	16.4
makes no difference	25.8	27.6
they would stay	54.6	56.0
Be seasoned technicians or professionals,	(N 163)	(N 221)
they would leave	26.4	20.8
makes no difference	20.2	23.1
they would stay	53.4	56.1
Be seasoned businessmen,	(N 160)	(N 215)
they would leave	46.9	36.3
makes no difference	29.4	32.1
they would stay	23.7	31.6
Obtain an apartment,	(N 166)	(N 227)
they would leave	2.4	.9
makes no difference	21.7	19.4
they would stay	75.9	79.7
Join kibbutz or moshav,	(N 160)**	(N 217)
they would leave	6.3	18.4
makes no difference	35.0	36.9
they would stay	58.7	44.7
Marry a Sabra,	(N 167)**	(N 221)
they would leave	8.4	12.2
makes no difference	16.8	32.1
they would stay	74.9	55.7
Be Zionists,	(N 165)	(N 223)
they would leave	11.5	7.2
makes no difference	30.3	24.2
they would stay	58.2	68.6

TABLE 2 (*continued*)

Question	Percentages Nonreligious (*N* 188)	 Religiously oriented (*N* 255)
Be fluent in Hebrew,	(*N* 170)	(*N* 232)
they would leave	1.2	1.3
makes no difference	22.9	22.0
they would stay	75.9	76.7
Seek American friends and relatives,	(*N* 167)	(*N* 226)
they would leave	8.4	6.2
makes no difference	47.9	42.9
they would stay	43.7	50.9

* Chi square significant differences = .02.
** Chi square significant differences = .001.

tlement (kibbutz or moshav) will stay. There was general agreement that Americans fluent in Hebrew will stay.

When considering seven possible reasons for Americans leaving Israel, religiously oriented felt more strongly than did nonreligious that family concerns cause emigration, 72.3 percent compared to 53.8 percent (chi square difference significant at the .001 level). There was a general consensus that the number one reason for leaving Israel relates to lack of job opportunities, followed by concern relating to inadequate housing and high cost of living. These American subjects included only 14.0 percent who plan to return to America; another 33.6 percent would not return, while 52.4 percent have no plans.

D. Discussion

American immigrants in Israel expressed increasing concern about the future of the Jew in America, and greater confidence about the position of the American in Israel. The quantitative increase in both areas reflected the reduction of dissonance among Americans who choose to remain in Israel (5).

Nonreligious were not as Jewishly oriented or as concerned about assimilation while in America (2). Nonreligious in Israel were as troubled about assimilation of Jews in America as the religiously oriented. However, religiously oriented have become more alarmed than the nonreligious about anti-Semitism and church-state relations in America. Though religious Americans were also more hopeful about relations between Jews in America and world Jewry, they expressed more concern about Jewish life in America, and more confidence about the position of the American in Israel. This feeling was reflected in their more intensive desire to have their children live, study, and marry in Israel.

Group differences in knowledge of Hebrew were not reflected as a group difference in feeling of ease (3). However, there was general agreement that speaking Hebrew helps Americans become integrated and stay in Israel. For the religiously oriented, more self-assured about their Jewishness, the process of integration was speeded up by what a person brings to his homeland (friends and relatives, cash). The nonreligious felt more keenly than the religious that integration, even in Israel, is more of a process of assimilating [marry a sabra (native Israeli), join a kibbutz (collective settlement)].[4]

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[4] Weinberg suggests ten or more years necessary for successful integration of (Dutch) immigrants to Israel.

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LONG TERM DISCRIMINATIVE OPERANT BEHAVIOR AND FOOD-STORING IN RATS* [1]

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A. INTRODUCTION

Generally in learning experiments the animals are trained until their performance reaches an asymptote or criterion and then testing is terminated. Although some studies (e.g., 1) have observed behavior under extended testing, there is little data on long term changes. Ferster and Skinner (2) suggested that performance under set contingencies will gradually change ("slow drift") and they conceptualized this as due to additional learning, such as the development of more sensitive temporal discrimination. A major interest of the present study was to observe rats in a bar-pressing task over an extended number of sessions.

A rat pressing a bar under continuous reinforcement will often press more than once before going to the food cup for the pellets. If the rat learned that only during a small amount of time that it was in the operant chamber did the bar yield reinforcement, it would be advantageous for the rat to spend all of this time just pressing and store up the food to eat later. A second purpose of this study was to see if rats would adopt such a strategy.

B. METHOD

1. *Subjects*

Six naive, male, albino rats, 120 days old at the beginning of the experiment, were housed individually with free access to water. The rats, maintained on 23-hour food deprivation, were tested for one-half hour every day, seven days a week, after which they received one-half hour of free access to food in their home cages.

2. *Apparatus*

The apparatus was a Gerbrands operant conditioning unit with a cue light above the recessed food tray and to the side of the lever. Lighting was from external overhead neon lights.

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[1] This study was supported in part by a local grant from Project Squeaky.

3. *Procedure*

Stage 1: All rats were first shaped to bar-press and then were allowed 100 reinforced presses for two successive days. Stage 2: For the next five days the rats were given a discriminative operant task with each 30-minute test session divided into alternate five-minute periods of cue light on (bar-press yields reinforcement) and cue light off (no reinforcement), with the first period being light on. Stage 3: For the next five days the task was the same as stage 2 except each light on period was only two and one-half minutes and each light off period was seven and one-half minutes. Stage 4: During the next five days each light on period was one minute and each light off period nine minutes. Stage 5: During the final stage, which lasted up to four and one-half months, each light on period was 20 seconds and each light off period was nine minutes 40 seconds.

Rat 4 died of respiratory disease after two months of testing and rats 3 and 5 died of respiratory disease at four months. The other three rats were tested for five months from the beginning of stage 1.

C. RESULTS AND DISCUSSION

1. *Decrease in Bar-Pressing*

During the last stage (stage 5) the rats had mastered the discriminated operant task and seldom bar-pressed during the light off period, except occasionally a few seconds prior to light onset. The consistency of their behavior is suggestive of an ability to estimate the nine minute and 40 second light off period.

The amount of bar-pressing by each rat decreased within each session across light on periods. But more important, for every rat the amount of pressing during light on periods decreased over days. For five of the rats (rat 4 was excluded because of its early death), the mean number of reinforced presses per session across days 4, 5, and 6 of stage 5 was 23.3. The range was from 18.3 to 27.7. The corresponding mean for days 54, 55, 56 was 11.8 with a range from 9.3 to 15.7. The difference between the two means is significant at less than the .0001 level ($t = 6.65$, $df = 4$). For the three rats that were tested for five months there was no significant change in the amount of bar-pressing from the 55th day to the end of testing. Thus there is a significant decrease in bar-pressing during stage 5, but it levels off after two months. Records of individual rats showed the decrease to be fairly monotonic with the rates staying fairly constant once they leveled off. For the three rats tested for five months there was a slight, but not significant, increase in rate of pressing near the end of the fifth month.

Rat 5 completely stopped pressing after the first 25 days of stage 5. It did not press at all for 12 days and then began again at a rate just below its rate prior to stopping. This rat appeared perfectly healthy during the time it wasn't pressing.

A possible explanation for the decline in bar-pressing over days is that with extended exposure food-contingent bar-pressing decreases in reinforcing value. One theory which might predict this result is Walker's (3) complexity theory in which continued occurrence of an event reduces its psychological complexity to an animal, causing the animal to seek out other events with higher complexity.

Another explanation is that the rats built up an expectancy of receiving food in their home cage after each session and stopped "wasting energy" pressing the bar. We tried to test for this at the end of the experiment by continuing the test sessions but without food in the home cage afterwards. This had no effect on bar-pressing and had to be discontinued after a few days to prevent the rats from dying of starvation. It may be that these few days were not sufficient to alter the expectancy built up over five months.

Whatever the explanation for the decrease in pressing, there must be some account of the individual differences. For although all rats showed the decrease, only one rat completely stopped. Were changes in complexity faster for this rat? Did it build up expectancies faster?

2. *Storing*

By visual observation it was recorded how much each rat stored during each light on period of stage 5. A rat was considered to be storing when it was not eating after each reinforced press. After seven days of stage 5, all rats were storing most of the time, but not in the food bin as expected. Rather they would store in their mouths. The common pattern was for the rat to press once, put the food pellet in its mouth, but not chew it. This would continue until the rat had six to eight pellets in its mouth, whereupon it would stop pressing and start chewing. The greatest amount ever stored was nine pellets. Storing was often completed while the rat still had more than five seconds left of light on period. With one exception the rats usually only pressed once before storing the pellet in their mouths. The exception was rat 2 which pressed twice almost every time before storing.

Rat 6 was the only rat to store after every press; the others stored most of the time. With the exception of a dropping off of storing within each session, there was no apparent pattern to when the rats would store.

It appears that with the above task rats learn to store, but store in their mouths. The rats adopted this behavior early in stage 5 and showed no evidence of shifting toward the "better" strategy of storing in the food bin. Perhaps if they were run longer they would develop this latter strategy.

More research is necessary to delineate the conditions under which rats will store. And it may be that single organism observation is the best approach to the problem.

D. Summary

Rats in a discriminative operant task were observed for five months. Bar-press rates dropped off across days and possible explanations were given in terms of a complexity theory of reinforcement and expectancy. With a short proportion of time during which bar-presses yielded food pellets, the rats stored the pellets in their mouths rather than eating after each press.

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ATTITUDE OF REHABILITATION PATIENTS TOWARDS THE WHEELCHAIR*[1]

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DOROTHY P. PEZENIK, AND JACOB L. HALBERSTAM

A. INTRODUCTION

Recent statistics show that there are almost 300,000 persons in the United States confined to wheelchairs. The prevalence of wheelchair use in the United States is 1.5 per 1000 population. The results of a national health survey, July, 1966, to June, 1967 (3) suggest that chronic disease accompanied by aging can be expected to increase the incidence of disabilities that require the use of the wheelchair.

Clinical experience (5, p. 9) has shown that "some patients accept the wheelchair as a necessity to meet physical need; others become attached to it because it is less taxing, easier, and more comfortable than walking. Thus, even when these patients begin ambulation it is difficult for them to relinquish the chair." A wide variety of investigations into the psychology of rehabilitation medicine and physically disabled patients has been undertaken in recent years. Many of these investigations have been specifically addressed to a description of the adjustment problems and the relationship of adjustment to other variables among these patients. Since the main focus of the present paper was upon the rehabilitation patient's reactions to his wheelchair, the selection of literature for review was directed toward a summary of the findings which pertained to adjustment to prosthetic and orthotic devices.

Weiss (7), for example, concluded that failure to utilize the prosthesis is due to personality difficulties of the amputee client. Dembo, Leviton, and Wright (4) indicated in their summary that the acceptance of a loss of a limb involves a change in the value structure of the disabled patient by regaining, psychologically, values other than those lost: e.g., by perceiving lost values as nonessential, etc. Among older amputee patients, favorable morale was

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[1] Supported by the Social and Rehabilitation Service, Department of Health, Education, and Welfare, under the designation of New York University as a rehabilitation research and training center.

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More research is necessary to delineate the conditions under which rats will store. And it may be that single organism observation is the best approach to the problem.

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Rats in a discriminative operant task were observed for five months. Bar-press rates dropped off across days and possible explanations were given in terms of a complexity theory of reinforcement and expectancy. With a short proportion of time during which bar-presses yielded food pellets, the rats stored the pellets in their mouths rather than eating after each press.

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found among those "experiencing less physical discomfort or symptomatology, caring for their own personal needs . . . engaging in more active type of recreation and capable of ambulation in a satisfactory manner. To the extent that negative changes occurred in physical condition, mode of living, ability to get about, and restrictions in activities, the attitude changed to become fair and, in a few instances, poor" (2, p. 124).

Barker and Wright (1, p. 31) pointed out that "worker-client relationships can diminish the maladjustive tendencies of the disabled person to devalue himself by encouraging him to participate actively in the rehabilitation process . . ." Wittkower (8) concluded that the main factors determining the type of reaction to disablement are the personality previous to the injury, the severity of the disability, and the probable functional efficiency of the artificial limb for the particular case.

To summarize the results of these investigations, it would seem that favorable adjustment to a disability and/or a prosthetic device was largely contingent upon the following factors: (*a*) the degree to which the patient either lost or perceived a loss of previous independent functioning, and (*b*) his perceptions of the physical and psychological resources available to him. Little is known about the attitudes of disabled patients toward their prosthetic and orthotic devices, the wheelchair in particular. The present study was undertaken to assess the attitudes of both disabled and nondisabled persons toward the wheelchair and to identify, among the disabled patients, variables related to positive and negative attitudes concerning the wheelchair.

B. METHODOLOGY

1. *Subjects*

One hundred and thirty-eight *S*s comprised the sample of this study. Of these, 86 were hospitalized patients and 52 were normals (student nurses and hospital aides). The former sample consisted of 48 male and 38 female patients who were currently on a physical rehabilitation program. These patients came from one of two sections of a general hospital, a rehabilitation ward for acutely disabled patients and a domiciliary for chronically disabled patients.

The mean age of the male patient *S*s was 45.7 years ($SD = 8.43$). Seventy-nine percent were born in the United States. Sixteen percent had been semiskilled workers, and another 27 percent had been unskilled workers. The *S*s in the male patient sample had a mean of 8.92 years of formal education ($SD = 1.93$).

Among the female patient *S*s, the mean age was 57.87 years ($SD = 7.76$). Seventy-six percent were born in the United States. Twenty-nine percent were single, 16 percent married, 3 percent divorced, 45 percent widowed, and 3 percent separated. The mean number of years of formal education was 8.82 ($SD = 1.36$).

In the nonpatient sample, there were seven male Ss who were hospital aides. Their mean age was 29.86 years ($SD = 5.75$). Five were single, and all had been born in the United States. They reported a mean of 11.21 years of formal education ($SD = 1.22$).

Forty-five female student nurses also served as Ss. Their average age was 26.22 years ($SD = 6.36$). Seventy-two percent had been born in the United States. This sample was almost equally divided between married and single. They had a mean of 11.60 years of education ($SD = 1.35$).

2. *Instruments*

An abbreviated version of Osgood's Semantic Differential (6) was utilized, along with instructions phrased in a manner which pretesting had indicated the patients could understand. Bipolar adjective pairs were selected from Osgood's standard list which seemed to have relevance to the concept to be rated (Wheelchairs). An attempt was made to include within the instrument a fairly representative selection of adjective pairs from each of the dimensions of meaning as found by Osgood through factor analysis, "Evaluation," "Potency," and "Activity."

A background information questionnaire was appended to elicit socioeconomic data. Additional questions pertaining to diagnosis, prognosis, and wheelchair usage of the patient subjects were also included. The adjective pairs utilized are reproduced below according to the dimensions of meaning to which they have been found to be empirically related.

"Evaluation": good-bad, beautiful-ugly, clean-dirty, high-low, valuable-worthless, kind-cruel, pleasant-unpleasant; "Potency": large-small, easy-hard, strong-weak, light-heavy; "Activity": graceful-awkward, active-inactive, fast-slow, warm-cold.

The adjective pairs were randomized for position and meaning dimension. All Ss were asked to rate the concept "Wheelchairs" on a seven-point scale. "Four" indicated a neutral point. In other words, if the S checked "4" for a particular adjective pair, then that particular adjective was irrelevant to this S in his report of the meaning that "Wheelchairs" had for him. "One" indicated a positive response, and "7" indicated a negative response.

3. *Procedure*

Each rehabilitation patient in the acutely and chronically disabled sections of the hospital was first screened for inclusion in the study by a physiatrist and an occupational therapist. These patients, who were considered potentially suitable for participation in the study, were then approached by a psychology trainee, asked to participate, and interviewed. At this point, language fluency, comprehension of the material, and ability to complete the material, either with or without assistance, were the criteria for the inclusion of the patient in the sample. Nonpatient *S*s were administered the Semantic Differential in a group and completed the questions pertaining to socioeconomic status. The occupational therapist completed the questions pertaining to socioeconomic status for the patients, as well as diagnosis, prognosis and wheelchair usage, either by transcription of the information from the patients' charts or on the basis of personal knowledge.

C. Results and Discussion

An examination of some demographic variables indicated that within the patient sample, 27 percent were amputees, 21 percent had a diagnosis of CVA, 17 percent poliomyelitis, and 34 percent all other diagnoses. Thirty-one percent of the patient sample had a prognosis of improving, 59 percent static, and 9 percent deteriorating. Thirty-seven percent of the patient *S*s were able to walk, and the remainder were partially or totally incapacitated with respect to this ability. Eighty-seven percent were currently using a wheelchair, of whom 74 percent were using a metal wheelchair. Seventy-two percent spent all day in the chair. Sixty-two percent locomoted with both arms; 24 percent had to be pushed. Sixty-six percent had been instructed in the use of the wheelchair. Seventy-nine percent of the *S*s using the wheelchair had received instruction in the use of other prosthetic devices.

Some trends were observed when the data were compared by scores for the dimensions of meaning, "Evaluation," "Potency," and "Activity" of the Semantic Differential. Table 1 shows the mean, "Evaluation," "Potency," and "Activity" scale scores and standard deviations by diagnosis. There it will be seen that the less severely impaired patients tend to rate the concept "Wheelchairs" more positively than the more impaired patients. The less disabled patient *S*s tended to perceive the wheelchair as more "good" and "active" than the more disabled patients. The *S*s in the nonpatient sample tended to rate the wheelchair less positively than the entire patient sample on all three dimensions of meaning.

Table 2 shows that patient *S*s, whose prognosis was rated by their physician as "improving" rated the concept "Wheelchairs" more positively on the "Activity" dimension and less positively on the "Evaluation" dimension than those whose prognosis was rated as static. In other words, the "improving" patients viewed the wheelchair as more "active" and less "good" than those whose prognosis was rated as "static."

TABLE 1
MEAN SCORES AND STANDARD DEVIATIONS ON THE SEMANTIC DIFFERENTIAL SCALES BY DIAGNOSIS

Diagnosis	Evaluation Mean	Evaluation *SD*	Potency Mean	Potency *SD*	Activity Mean	Activity *SD*
Amputee ($N = 23$)	2.66	.79	3.49	.86	2.76	.93
Fracture ($N = 7$)	2.45	.48	3.55	.85	2.96	.82
Paraplegia ($N = 8$)	3.26	1.25	4.04	.33	2.69	.76
Neurological ($N = 3$)	3.72	1.55	3.22	.92	3.58	1.23
CVA ($N = 18$)	2.95	.82	3.70	.77	3.00	.93
Polio ($N = 15$)	3.31	.86	3.14	.78	4.00	1.25
Other ($N = 12$)	2.82	.98	3.53	.64	3.06	1.07
All patients ($N = 86$)	2.93	.92	3.52	.78	3.11	1.07
Normals ($N = 54$)	3.57	.85	3.77	.74	3.93	1.14

TABLE 2
MEAN SCORES, STANDARD DEVIATIONS, AND *t* RATIOS ON THE SEMANTIC DIFFERENTIAL SCALES BY PATIENTS' PROGNOSIS

	Prognosis				
	Improving $N = 27$		Static $N = 51$		
Semantic Differential scales	Mean	*SD*	Mean	*SD*	*t*
Evaluation	2.62	.78	2.07	.77	2.19*
Potency	3.59	.82	3.50	.77	NS
Activity	2.60	.91	3.30	1.07	3.02**

* $p < .05$.
** $p < .01$.

Table 3 shows that the patient *S*s who were able to locomote a wheelchair with both arms tend to rate the concept "Wheelchairs" more positively on the "Evaluation" and "Activity" dimensions and less positively on the "Potency" dimension as compared with patients who locomoted by all other means. Thus, the former group of *S*s tended to perceive the wheelchair as more "good" and "active" and less "potent" as compared to the perception of the wheelchair of all other patients in the sample.

Additionally, a trend was observed for patient *S*s who spent the most time

TABLE 3
MEAN SCORES AND STANDARD DEVIATIONS ON THE SEMANTIC DIFFERENTIAL SCALES BY PATIENTS' METHOD OF WHEELCHAIR LOCOMOTION

	Method of locomotion				
	Both arms $N = 47$		All other methods $N = 29$		
Semantic Differential scales	Mean	*SD*	Mean	*SD*	*t*
Evaluation	2.79	.97	3.10	.89	NS
Potency	3.55	.78	3.42	1.66	NS
Activity	2.88	1.00	3.50	1.17	NS

per day in a wheelchair to rate the concept as more "active" in comparison to patients who spent less time in a wheelchair. Finally, patient Ss who walked, or walked part-time, rated the wheelchair significantly more "active" (Mean $= 2.79$, $SD = .93$) than Ss who were unable to use hands or feet (Mean $= 3.34$, $SD = 1.12$). The t ratio for the difference between the observed means was 2.47 ($p < .05$).

The correlational data are also of interest. In the patient sample, the correlations between age, on the one hand, and the scores on the "Evaluation" ($r = .24$, $p < .05$) and "Activity" scales ($r = .27$, $p < .05$) on the other hand, indicate that the older the S, the more positive the evaluation of the wheelchair and the more "active" was its meaning as a concept. The patients' years of education were negatively related to the "Activity" scale scores ($r = —.29$, $p < .01$). In other words, the more educated the patient, the less "active" was the meaning of the concept, "Wheelchairs."

In general, the results appeared to indicate that the less disabled, as compared to the more disabled patients, perceived the meaning of the wheelchair as "good," "active," but at the same time, comparatively less "potent." To the less disabled patients, the wheelchair appeared to have positive value as a means of locomotion. This perception of the wheelchair may be due to its value as an effective replacement for a loss of function.

The results with respect to prognosis suggest that the wheelchair is perceived as an extension of the patient's own body. This perception realistically reflects the extent of the disability and the extent of the remaining physical and psychological resources.

That normal Ss rated "Wheelchairs" less positively may be attributed to a negative stereotype of the disabled, held by nondisabled persons, and the notion, held by the latter group, that the wheelchair may reflect a loss of function. The data suggested that an emphasis upon available physical and psychological resources on the part of the disabled Ss could account for the perception of the wheelchair maintained by this group.

In general, it seems fair to state that the health status of the patient Ss, as evidenced by age, diagnosis, prognosis, method of wheelchair locomotion, ambulation, and time per day spent in the wheelchair was, by and large, positively related to the meaning that the wheelchair had for them. It may be that time perspective plays an important role in shaping the attitude of the disabled person toward the wheelchair. That indices pertaining to time perspective—i.e., age prognosis and time per day spent in the wheelchair—were found to be positively related to attitudes suggest that the less severely disabled patient may feel that his affliction is only temporary and will be relieved within a finite period of time. He may perceive more alternatives in his situation and feel himself more autonomous in the attitude he adopts toward prosthetic and orthotic devices.

The data from the present study is by no means definitive. However, the results of this initial study suggest variables, the investigation of which, may prove more fruitful in future research. Variables such as expectancy, level of aspiration, time perception, functional disability, and length of hospitalization seem to require further study.

It is worthy of note that the more disabled patient *S*s were closer to the nondisabled *S*s in their perception of the wheelchair. Thus, the severely disabled person may be consonant in his self-image with the stereotype held regarding him by nondisabled persons. The data further suggested that the wheelchair may be seen by the patients as an extension of their own bodies. In summary, the data appeared both to confirm and supplement the results of previous investigations.

D. SUMMARY

Rehabilitation patients on acute and chronic wards and nondisabled *S*s were administered a questionnaire to ascertain their attitude towards the wheelchair. The more severely impaired patients rated the wheelchair less positively than the less severely impaired patients. The data further suggested that health status of disabled patients was positively related to attitudes toward the wheelchair.

The basis of the nondisabled *S*s' attitude appears to be a negative stereotype of the disabled and disability, and the notion that the wheelchair reflects a loss of physical functioning. The attitude of the disabled seemed to reflect an emphasis upon the perception of remaining physical and psychological resources available for adjustment to disability and adaptation to the environment.

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CRYSTAL GAZING: SUBJECTIVE RESPONSES TO ONE OF FOUR UNSTRUCTURED PROJECTIVE MEDIA*[1]

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A. INTRODUCTION

The validity of the projective hypothesis—that internal needs influence an individual's perception of external reality—has been demonstrated repeatedly, but the same cannot be said of specific projective tests (1, 2, 6). Many of the leading tests seem impervious to negative experimental findings, and not all available tests have achieved equal acceptability. Seemingly promising approaches, like Skinner's verbal summator, have not been adopted, whereas others, from Kerman's "Cypress Knees" (3) to the Szondi (9), have had only limited appeal.

The tests differ in structure, especially in the degree of stimulus ambiguity presented, and the available projective instruments could be ordered along a continuum between two theoretical poles—completely unstructured at the one end, and fully structured at the other. Thus, the Thematic Apperception Test (TAT), which employs complete pictures as stimulus materials (except for the blank card 16), would be placed near the structured terminal of the scale. The Rorschach inkblots would be placed in the central region of the scale, whereas the Whipple inkblots would be closer to the unstructured end of the continuum, since they are neither symmetrical nor colored. The blank card in the TAT series would represent still a closer approximation to the unstructured terminal, as would Struve's Cloud Pictures.

The success of the TAT indicates that projection does take place with stimulus materials that approach the pole of complete structure. The success of other instruments indicates that projection also takes place with stimulus materials of lesser structure (5, 10). The present series of studies was designed

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[1] This paper was written by the junior author and constitutes an abbreviated report of a longer manuscript prepared by the senior author prior to his current illness. The junior author was the senior author's student during 1947-1949 at the College of William and Mary and his undergraduate research assistant during 1948-1949 when data collection was completed with the first group of 27 *S*s reported herein.

[2] Now Professor Emeritus, and formerly Head of the Department of Psychology.

to measure the extent to which projection would occur with four unstructured projective media, and especially with a glass sphere.

B. METHOD

These studies were conducted over the 18-year period from 1942 through 1959 at two relatively small liberal arts colleges (College of William and Mary, and Chatham College). The general methodology described in this section was used in all of the studies; conditions specific to individual studies are described, where appropriate, in the Results and Discussion section.

1. *Projective Media*

Four materials were used as projective media: sheets of (*a*) clear glass, (*b*) frosted glass, and (*c*) gray cardboard, each 4 by 4 inches square, and (*d*) a 2-inch diameter glass sphere or crystal ball (hereinafter called a "crystal"). Items *a* and *d* provided reflective surfaces, whereas items *b* and *c* were nonreflective.

Each medium was presented to *S* in a small black box with a 5 by 5 inch wood base and three 9-inch high cardboard sides. The box had neither a fourth side nor a top. When the crystal was used, it was placed in a small indentation at the center of the base. When each of the other media was used, it was placed on the base and leaned at an angle of about 45 degrees against the back side of the box. Artifacts such as surface fingerprints were avoided.

2. *Subjects*

A total of 169 undergraduate students served voluntarily as *S*s. They ranged in age from 17 to 22 years. The minimum *IQ*, as measured with the Otis Self-Administering Test of Intelligence, was just over 100; the distribution was typical of college students and somewhat higher than the general population.

There were 27 *S*s in the first group tested, 11 men and 16 women, and 16 women in the second group. The remaining 126 *S*s (women) were divided into six groups of 21 *S*s each. Three of the groups (63 *S*s) were selected at random from listings in the student directory; the other *S*s were obtained haphazardly from various classes or student gathering places. Neither foreign students nor members of nonwhite racial groups were included to avoid possibly confounding cultural differences.

3. *Apparatus*

The projection sessions were conducted in a small, quiet, undecorated room that contained a one-way vision screen, but no outside window. It was furnished with a small metal table and chair. Room illumination, a variable of interest, was provided by one of two independent sources: a ceiling fixture that gave direct light, and a gooseneck lamp with its semispheric shade adjusted to shine only on one wall beyond *S*'s direct view. With the ceiling light extinguished, the entire room was filled with diffuse light that minimized the possibility of reflections on the projective media. This illumination was quite dim (60-watt frosted bulb, with line voltage reduced to 50 volts), but *S* typically had no difficulty in seeing the medium after adapting to the semidarkness.

Each *S* was asked to vocalize description of the percepts that appeared during the session, and those vocalizations were recorded on magnetic tape with use of a microphone placed behind the box on the table. The tape recorder was located in an adjacent room where it could be monitored by *E*.

4. *Procedure*

Three different pre-exposure conditions were employed systematically in some of the studies: (*a*) *S* was presented with, and asked to respond to five of the Whipple inkblots (Numbers 1, 2, 6, 8, and 10), (*b*) *S* was first asked to use Shneidman's (7) Make-A-Picture-Story (MAPS) test with three backdrop cards (the shack, cave, and daydream), then *S* was presented the Whipple inkblots as in the first condition, and (*c*) *S* was provided no pre-exposure projective experience. The instructions given by *E* in the experimental room differed according to the condition in which *S* served.

In general, the instructions described the study as an investigation of imagination—a study of fantasy. The pre-exposure condition (if any) was explained as was also the principal condition (combination of room illumination and projective medium) to which *S* had been randomly assigned. Where indirect illumination was to be used, *S* was instructed to cut off the ceiling light after he had completed the pre-exposure condition (or when *E* left the room, if there was no pre-exposure); he was also warned of the dimness of the resulting ambient illumination and told that he could expect to adapt to the dimness rather quickly. The tape-recording procedure was explained, and *S* was told to draw a number without replacement from a supply of prenumbered slips of paper; *S* was instructed to vocalize this number (but not his name) when the recording began as *E* left the room.

No time limit was imposed for either the MAPS or inkblot pre-exposure conditions, but the length of time permitted during the experimental exposure was limited. The limits employed varied from study to study to permit a comparison of projection productivity as a function of this variable. In the instructions, *S* was told merely that he need not be concerned with the passage of time, since *E* would keep track and terminate the session at the proper time.

5. *Scoring*

An index of projective responses, or projection score, was needed. A special scoring key was developed when it became evident in pilot investigations that *S*s differed greatly in "verbosity," or the number of words employed to express a single idea. The scoring key provided a count of the number of ideas expressed by *S*, and it permitted the classification of *S*s into "nonprojectors" (nine or fewer ideas expressed) or "projectors" (ten or more ideas expressed). It was applied to a typewritten transcript of *S*'s projections.

In general, the key provided a single count for each (*a*) noun, (*b*) compound personal pronoun or indefinite pronoun, (*c*) adjective, except interrogative, demonstrative, or distributive, (*d*) verb, except auxiliary verbs when used alone, and (*e*) adverb or preposition when used to denote position or time. Articles and conjunctions were not counted. In addition, the key listed several specific rules designed to assist the scorer in identifying single ideas independently of the number of words employed.

C. RESULTS AND DISCUSSION

1. *Scoring Characteristics*

Since the major results are based on the projection scores, some determination had to be made of the reliability of the scoring procedure. An undergraduate assistant was asked to score the transcriptions of 42 *S*s randomly drawn from the total of 169. Her knowledge of the scoring procedure came exclusively from reading the key and studying the scored example appended to it. Her results were compared with those of an experienced scorer who had helped to develop the key. The rank-order coefficient of correlation between the two scorers over the 42 cases was +.98, and their two means were not statistically different.

The distribution of projection scores departed markedly from normal; in the 13 decile ranges between 0-9 and 120-129, the frequencies were 38, 35, 15, 6, 10, 3, 7, 6, 2, 2, 0, 0, and 2, respectively, for the 126 young women who comprised the six groups of 21 *S*s (these six groups did not differ in terms of the numbers of nonprojectors). A square-root transformation did not materially improve the distribution, so it was decided to use the raw scores with distribution-free statistical tests (8) wherever possible.

The scoring key was used to obtain not only the projection score (number of ideas), but also a verbosity score based on the number of "non-idea" words—words omitted by the key. The rank-order coefficient of correlation between the two was +.847; projective ability or productivity apparently goes hand-in-hand with verbosity. Although this also implies that the projection score should correlate highly with a simple word count, the score was preferred as the more likely to provide an accurate and valid index of the projective responses.

2. *Individual Differences*

The only males employed were the 11 men in the first group of 27 *S*s. Six of these men and one of the 16 women were nonprojectors (nine or fewer ideas projected); the contingency was statistically significant ($\chi^2 = 7.917$, $df = 1$, $p < .01$). The proportion of nonprojectors among young men is apparently greater than among young women.

Of the six groups of 21 young women, three (or 63 *S*s) had been obtained haphazardly and three (63 *S*s) by random selection. Twenty-six of these 126 *S*s were classified as nonprojectors, 11 from the randomly selected and 15 from the haphazardly obtained *S*s. The difference was not statistically significant.

3. *Projective Media*

Differences in projection responses to the four unstructured projective media were measured with one group of 16 *S*s, each of whom responded in separate sessions to each of the four media. No pre-exposure stimulus was used with any of these *S*s. The order of the four media was counterbalanced in a Latin-square design over each subgroup of four *S*s. An analysis of variance of the projection scores indicated that there were no significant effects attributable to the type of medium, the orders of presentations, or the serial order of trials, nor to any of the interactions.

The 16 *S*s projected 245 ideas with the crystal, 242 with the sheet of clear glass, 216 with the gray cardboard, and 182 with the frosted glass. The number of ideas projected with the reflecting (487) was significantly greater than with the nonreflecting (398) media ($t = 2.38$, $df = 15$, $p < .05$). In general, *S*s tended to react consistently to the different media, in spite of the difference in "pull" or mean number of responses elicited with the reflecting and nonreflecting materials. The rank-order coefficient of correlation between the projection scores obtained with the two classes of media was +.92.

4. *Crystal Gazing and Ambient Illumination*

Of the 126 *S*s in the six groups of 21 *S*s each, half (63 *S*s) projected with the crystal in a "normally" lighted room (i.e., with the ceiling light on), whereas the other half projected in the room dimly illuminated with diffuse light. There was no statistically significant relation between the lighting conditions and the classification of *S*s as projectors or nonprojectors. Furthermore, the mean projection scores of the 111 projectors did not differ between the "bright" and "dim" illumination.

One statistically significant difference attributable to the ambient illumination was noted. Approximately half (51 percent) of the projecting *S*s began their projections by reporting their own reflection in the crystal, and the number of *S*s who did so under the ceiling-light condition was significantly greater than the number who did so under the dim-diffuse light ($\chi^2 = 25.36$, $df = 1$, $p < .01$).

5. *Crystal Gazing and Pre-Exposure Experience*

The data of one group of 21 *S*s who were presented parts of the Shneidman Make-A-Picture-Story test and the Whipple inkblots prior to exposure to the crystal were compared with the data of another group of 21 *S*s who were given no pre-exposure projective experiences. The number of nonprojectors did not differ under the two conditions. The mean projection score of the "prepared" group was 20.33, whereas that of the "unprepared" group was 24.52; the difference was not statistically significant.

Two of the groups of 21 *S*s were given pre-exposure experience with the Whipple inkblots alone. Their mean projection scores with the crystal were essentially identical, so the data of the two groups were combined and used to measure the average relation between the numbers of ideas projected with the crystal and the more highly structured inkblots. The rank-order coefficient of correlation between the inkblots and crystal was +.58. Also, a rank ordering of the typed transcriptions of the 42 *S*s' crystal-gazing responses was made for "imaginativeness" by the senior author; the rank-order coefficient of correlation between this ordering and the ranked crystal projection scores was +.80. These results suggest that crystal-gazing responses may provide a valid index of imaginativeness.

6. *Reliability of Crystal Gazing*

In order to estimate the *split-half reliability* of the technique employed, a sample of 15 records was selected at random from among those (in the six groups of 21 *S*s each) that had been assigned crystal-gazing sessions of 480-second duration. An allowance was made for "warm-up" time, and each session was bifurcated at 300 seconds (the actual responding times in the "halves" were about equal). An idea-time ratio was computed to express the average time necessary for the expression of one idea by each *S* during the first and second "halves" of the session. The rank-order coefficient of correlation between the two parts of the session was +.73.

7. *Test-Retest Reliability*

Test-retest reliability was estimated with data obtained by requiring one group of 21 *S*s to return for a second crystal-gazing session on the day following their first experience (no pre-exposure material was used in either session). The rank-order coefficient of correlation between the projection scores obtained in the two sessions was +.77. The difference in average projection score of the test and retest condition was not statistically significant.

8. *Subjective Factors in Crystal Gazing*

The influence of the instruction being given by an authority figure or by a peer was tested. Half of the 126 *S*s (in the six groups of 21) were instructed by the senior author, and half by an undergraduate assistant. Of the 63 *S*s with projection scores greater than the combined median (66.5), 34 had been instructed by the authority figure and 29 by the student assistant. The difference was not statistically significant.

An attempt was made to assess the effects of *S*'s cooperativeness on crystal-gazing projections. Punctuality was employed as a criterion, and *S*s were classed as "cooperative" if they arrived at or before their scheduled appointment. Between 20 and 30 percent of the *S*s in each group were late for their appointments and were classed as "uncooperative" with this criterion. Neither the differences among groups in the proportions of "uncooperative" *S*s, nor the differences between the two classes of *S*s in the proportions of projectors (*versus* nonprojectors) was statistically significant. It could be that either the criterion employed is a poor one, or there is no strong relation between cooperativeness and projection productivity, or both.

In order to assess the influence of another subjective factor, one group of 21 *S*s was told parenthetically with their instructions that projectors tended to be individuals with low intelligence. A control group of the same size was not given this false information. A total of seven *S*s in the experimental group and 13 of the controls were projectors; the difference approached statistical significance ($\chi^2 = 3.436$, $df = 1$, $.05 < p < .10$).

About 20 percent of the *S*s engaged in self-initiated "experimentation" by varying the position of the crystal ball or of themselves, apparently in order to judge the extent to which their projections were stimulated by reflections. A check of a random selection of 21 freshmen and 21 seniors failed to show any relation between the year of college and the occurrence of such self-initiated experimentation.

9. *Content of the Crystal-Gazing Projections*

Although a detailed analysis was not made, some observations regarding the content of the projections were recorded. Some of the projected materials were traced to memories of recent experiences (e.g., a trip to Europe and projections of the *Arc de Triomphe*). Much was symbolic and potentially useful in deeper explorations of the projector's personality. For example, the following projection was recorded from the vocalizations of one young woman using the crystal: "I see a hand that is between two objects that are trying to stop the hand from touching something at the bottom. . . . These objects could be anything at all and they're just trying to squeeze the hand so it won't reach further down so it can't reach this thing at the bottom. . . . It could be maybe a little girl who wants to have a piece of candy at the bottom and she knows she's not allowed to have it."

The symbolic nature of the projection was generally not apparent to *S*. When asked to do so in postexperimental interviews, however, most *S*s offered some interpretation of their projections. About 88 percent linked items in the transcript with their life experiences. Some made only vague general statements, but others attempted to give "rational" explanations (e.g., "a baby" was explained as: "I lost my dog about a month ago. He was a little dog. That might be it.").

Emotionally charged projections were made by *S*s under all conditions. Most of these appeared to have been unpleasant (e.g., "Some sort of face . . . a very hideous face"), but a few *S*s exhibited pleasant emotional experiences (e.g., "I keep seeing a line . . . it seems to be smiling at me, laughing."). Based on a sample of the records of 42 *S*s (five of whom were nonprojectors), it is estimated that one or more emotionally charged projections can be expected about half the time (20 *S*s did so, 13 clearly did not, and four were "doubtful" cases).

10. *Postexposure Interviews*

The senior author interviewed a total of 57 *S*s selected at random from the 126 *S*s in the six groups. The interviews were conducted about a week after *S*'s exposure to the crystal. Three classes or types of projectors had been observed during these studies, and the sample contained *S*s of each type; specifically, there were ten type-A, 23 type-B, and 24 type-C projectors.

In general, type-A projectors were identified by their percepts' having come directly, without transition, from the empty void represented by the unstructured projective medium employed (e.g., "So far, I can't see anything. . . . I still can't see anything, . . . it's just black. . . . There is nothing. . . . Now I see the sun . . . and a flower. . . . Now the wind is blowing the flower. . . ."). Type-B projectors were identified by their use of pseudo-objective shadows and clouds in the medium as building materials for further projections into familiar percepts (e.g., "I see a black shadow of something, . . . it looks like a cat's face. . . . It's gone away now. . . . Now it looks like a human face. . . ."). The type-C *S*s were essentially nonprojectors; either they reported nothing, or they reported objects reflected by the medium and relatively simple projections based on such reflection.

Attempts to identify correlates of the differences, especially between the type-A and type-B projectors, were not entirely successful. For example, the differences in types A and B projectors were not significant in terms of motivation to project or claimed ability to project, as determined from responses to standardized questions asked during the interviews. Likewise, the two types did not differ in terms of the frequencies of those who reported having experienced a "dreamy state" during projection, nor of those who reported that "great concentration" was necessary in order for them to begin to project. It was noted, however, that some *S*s tended to observe the projected material essentially as spectators watching a show, whereas other *S*s saw themselves become absorbed in the projections like actors playing a part, similar to Moreno's (4) observations; the type-A projectors tended to be of the spectator type relatively more frequently than the type-B projectors ($p < .05$, with Fisher's exact test). There was no statistically significant difference between the two types in terms of the making of emotionally charged responses.

Certain characteristics of the projected materials were checked to see if these were related to the classifications as to type of projector. The two types did not differ in terms of the frequency with which they used color responses, nor in the frequency with which they reported movement in the projections. However, the type-B projectors did report their projections as having been in sharp focus more frequently than did the type-A projectors ($p < .01$, with Fisher's exact test). Also, the greater frequency with which the type-B projectors reported three-dimensional percepts approached statistical significance ($p = .08$, with Fisher's exact test).

D. Summary

Projective media that employ extremely unstructured stimuli were used to elicit the phenomenon of projection. Such unstructured projective media,

especially the glass sphere or crystal, could be used in the exploration of either personality dynamics or specific characteristics such as imaginativeness or fantasy (5, 10). The "projective pull" of the four media employed—a glass sphere or crystal, a pane of clear glass, one of frosted glass, and a square piece of gray cardboard—did not differ in terms of *S*s' mean projection scores (numbers of ideas expressed by *S*s during the projection sessions), but there was a significant advantage in favor of the reflecting over the nonreflecting media.

Among the other factors investigated, it was found that the illumination of the room had relatively little influence on the projections. Pre-exposure to other projective stimuli (e.g., inkblots) did not influence the projections made with the crystal immediately afterwards. There were more nonprojectors among men than women, but *S*'s cooperativeness was unrelated to the projection score. When told (falsely) that a negative correlation existed between *IQ* and projection, *S*s tended to produce fewer projections. Once begun, the rate at which ideas were projected per unit time remained relatively stable across the 8-minute projection sessions.

Probably the most important finding is that projection does occur in response to stimulation of an extremely unstructured nature such as provided by the glass sphere, panes of glass, and the gray cardboard used here. Even with such unstructured projective media, *S*s were able to project personally relevant matter that was both richly imaginative and intimately revealing.

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INTERNAL *VERSUS* EXTERNAL CONTROL OF REINFORCEMENT AND AWARENESS IN A CONDITIONING TASK*

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A. INTRODUCTION

The degree to which an individual perceives reinforcement to be contingent upon his own behavior *versus* the degree to which he attributes reinforcement to forces outside of and independent of himself, such as luck, fate, or chance (internal *versus* external perceived control of reinforcement, respectively), has been demonstrated to be an important variable in learning (e.g., 4, 12, 14, 15).

It has been shown that *S*s who perceive control of reinforcement as internal, as compared to external, are more likely to be conditioned and the conditioning to be more rapid (e.g., 1, 5, 6, 9). Also, in an ambiguous situation, internals are more likely to perceive the outcome of a task as skill determined: i.e., a function of their behavior, whereas externals are more likely to perceive what eventuates as chance determined (e.g., 13, 14).

Awareness, which is usually defined as verbalization of the response-reinforcement contingency, has been demonstrated convincingly to mediate conditioning in a variety of situations (e.g., 2, 7, 8, 16). In this study it was assumed that both awareness and internal *versus* external control of reinforcement must be considered for an adequate explanation of learning.

With the use of the Internal *Versus* External Control of Reinforcement Scale (the I-E Scale) developed by Rotter, Seeman, and Liverant (15) to determine *S*s who were high internals and high externals, it was hypothesized that performance on a task involving *S*'s prediction of flashing light patterns would show that (*a*) more internals than externals would be aware of the correct contingency, (*b*) internals would score more correct responses than externals, (*c*) in the postsession interview (PSI) more internals than externals would describe the task as skill determined rather than chance determined, and (*d*) externals would be more likely to exhibit the gambler's fallacy when this was defined as the tendency to repeat the same response as the previous trial when the previous trial had been incorrect.

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B. METHOD

1. *Subjects*

Ninety Pomona College students were given the I-E Scale and, of these, 34 students—17 classified as internal and 17 classified as external—participated in the experiment. The students were divided into internal and external groups by classifying those *S*s as external who scored in the top quartile of a distribution of scores compiled by Rotter (12) at Ohio State University, and those *S*s who scored in the lowest quartile were classified as internal. *S*s scoring in the middle of the distribution were not used.

2. *Apparatus*

S and *E* were seated on opposite sides of a small table with a screen partition, with two lights placed through openings in the screen.

3. *Procedure*

The following instructions were read to the *S*: "In this experiment a series of sequences of these two lights will be presented to you. A sequence may be from three to ten flashes long. Each sequence represents one trial and there will be 50 trials. At some random point in each sequence I will stop the flashes and say 'next' and you will tell me whether you think light number one or light number two would be the next flash in that sequence. Do this by stating 'one' or 'two.' I will tell you whether you are correct or incorrect."

*S*s were randomly assigned to one of the three conditions: random, n-1, or n-2. The random condition served as an index of behavior where a strategy could not be devised that would insure more than 50 percent reinforcement, which was used to test for the gambler's fallacy. The n-1 condition made the correct response dependent upon the last flash presented on each trial. To make a correct response, the *S* had to say the number that was the opposite of the last light flashed. To make a correct response in the n-2 condition, the *S* was required to say the number opposite to the second to the last flash. These conditions represented increasing difficulty due to the increased temporal remoteness of the stimulus which determined the correct response.

After the 50 conditioning trials were completed, a short post-session interview was held in which the extent of the *S*'s awareness of the correct contingency and his thoughts about the nature of the task were investigated.

C. RESULTS

Combining both n-1 and n-2 conditions, a chi-square test showed internals significantly more aware of the correct response-reinforcement contingency than externals ($p < .01$). For the n-1 and n-2 conditions separately, a Fisher Exact Test (3) showed more internals aware ($p < .05$).

A *t*-test for the difference between means was used to analyze the number of correct responses in each group. None of the differences was significant although all were in the predicted direction. However, all *S*s who were classified as aware of the correct response-reinforcement contingency in the PSI (six internals and one external) were observed to have had a sharp increment in correct response rate during the session. No unaware *S*s demonstrated this increment. It is reasonable to infer that this increment in correct response rate was a function of awareness. Internal *S*s who were aware, subsequent to the inferred moment of awareness, had a significantly greater ($p < .05$) correct response rate than either unaware internals or externals.

In the PSI the *S*s were asked to state whether they thought the task was skill or chance oriented regardless of whether or not they became aware of the correct contingency. Combining both the n-1 and n-2 conditions and using a chi-square test, internals perceived the task as skill determined significantly more often than externals ($p < .01$). A Fisher Exact Test comparing internals and externals in the n-1 condition showed internals perceived the task as skill determined significantly more often than the externals ($p < .005$). The same results were found in the n-2 condition ($p < .05$).

The gambler's fallacy, or the tendency to repeat the same response as the previous trial when the previous trial had been incorrect, showed a nonsignificant difference between the internals and externals in the random condition by a *t*-test. However, the tendency was for externals to commit the gambler's fallacy more often than internals.

D. Discussion

Although total number of correct responses was not significantly different for internal *versus* external *S*s, aware *S*s performed at a 100 percent correct response rate after the moment of awareness, whereas unaware *S*s made errors even through the last trial of the conditioning. Also, internals had a significantly greater correct response rate, subsequent to the moment of inferred awareness, than either unaware internals or externals.

The results also suggested that perceived locus of control of reinforcement influences learning as suggested by Rotter's social learning theory (10, 11). External *S*s were significantly more likely to view the task as chance determined and, as was shown by PSI data, were less likely than internals to keep testing hypotheses for the correct contingency. This lends support to the hypothesis that high externals such as schizophrenics and psychopaths are conditioned more slowly than normals (e.g., 1, 5).

Overall results indicated that the approach to a learning situation is determined by locus of control when perceived locus of control influences the tendency to become aware of contingencies in the environment (with internals being more likely to become aware); and further, that awareness is necessary to conditioning so that the internal *S* is more likely to be conditioned.

E. SUMMARY

Given a task of predicting light patterns from two flashing lights, *S*s classified as internal from the I-E Scale were significantly more likely to view the nature of the task as skill determined and were significantly more likely to become aware of the correct response-reinforcement contingency than were *S*s classified as external. Externals tended to commit the gambler's fallacy more often than internals although this difference was not significant. Number of correct responses on the task was not significantly different for internals and externals except subsequent to the moment of inferred awareness when aware internals had a significantly greater correct response rate than either unaware internals or externals.

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COGNITIVE STYLE AND THE USE OF INCIDENTAL CUES IN PROBLEM SOLVING*[1]

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A. Introduction

Recently, Mendelsohn and Griswold (5, 6, 7) have reported relationships between several personality characteristics and individual differences in incidental cue utilization in problem solving. In these experiments, subjects (*S*s) were led to believe that they were participating in a study of learning and memory under distracting conditions and were exposed to one list of words to be memorized (focal list), while a second list, to which they were not to attend, was heard in the background (peripheral list). *S*s were then asked to solve anagrams, some of the solutions to which were, unbeknownst to *S*s, words appearing on the two lists. Memory for the focal and peripheral lists and vocabulary level were unrelated to the solution of anagrams cued by words appearing on these lists. But, (*a*) Remote Associates Test performance was related to focal cue utilization primarily for males, although it was related to peripheral cue utilization in both sexes; (*b*) Welsh's *R* appeared more closely related to peripheral cue utilization in males, while no clear-cut sex differences in its relationship with focal cue utilization appeared.

The foregoing results were interpreted, in part, in terms of wide and effective attention deployment. The present experiment represents a test and extension of this interpretation and reports the relationship between the use of incidental cues in problem solving and two principles of cognitive control: scanning and field articulation (3).

The scanning control principle refers to relatively stable individual differences in breadth of attention deployment to stimulus fields. In order for a cue to be potentially useful in the solution of an anagram, it must first appear in

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the group of associates aroused by the anagram stimulus. Since extensive scanners characteristically attend to broader stimulus ranges, it is more likely that the cue word will be aroused by the stimulus anagram. In this way the scanning control principle should be relevant to the utilization of cues which appeared in both the peripheral and focal lists. Further, for cues in the peripheral list to be potentially available during problem solving, they must first have been attended to in the learning period. High scanners, since they characteristically deploy attention widely, would be more likely to have attended to this peripheral list and thus have a greater likelihood of solution of peripherally cued anagrams.

The level of cued anagram solution should depend not only on the breadth of attention deployment, but on effective attention deployment (6). Attention to the aroused associates must be selective, if competing, erroneous, solutions are to be eliminated. The principle of field articulation refers to this individually consistent capacity for selective attention. It has been shown for males that field articulation is unrelated to the number of anagrams solved, but is related to the number of incorrect solutions emitted (2). Low scorers on measures of field articulation, in other words, are less able to inhibit erroneous associates, but are not less adequate anagram solvers *per se*.

On the basis of the above formulation, it was hypothesized that (*a*) scanning and field articulation would be linearly related to the use of incidental cues in problem solving; and (*b*) more variance would be accounted for by scanning control in the case of peripherally cued anagrams than in the case of focally cued anagrams.

B. METHOD

1. *Subjects and Classificatory Variables*

All students in introductory psychology courses at the University of Missouri-St. Louis summer session were administered a test of field articulation (Concealed Figures, Cf-1, Form B) during a class period early in the course. From this pool, 83 females and 67 males volunteered to participate in the experiment.

Scanning control was assessed with apparatus and procedures similar to those employed by the Menninger workers (e.g., 4). The *S*'s task was to adjust a variable circle of light (22.2 mL, with a surrounding ground of 2.9 mL) until it appeared to be exactly the same size as a standard held parallel to and in the same plane as the variable light patch. Four judgments (in ADDA order) from constant starting positions were made for three 36 mm diameter discs. The order of discs (black, 18.6 gm; grey, 18.6 gm; black, 24.6 gm) was constant for all *S*s.

2. *Cue Utilization Procedures*

Details of the procedure may be found elsewhere (6), and will be but briefly presented here. *S*s, in groups of three to 25, were required to memorize a list of 25 words, while in the background a tape recording of an additional 25 words was played at the rate of two seconds/word. After this ten-minute period, *S*s were asked to solve anagrams prior to completing the "memory experiment." Actually, the anagram solving performance was the dependent variable. Of the 30 anagrams presented in a random sequence at the rate of 15 seconds/anagram, ten had as their solutions words appearing in the memory (focal) list, ten had as their solutions words appearing in the tape recording (peripheral) list, and ten were not cued by any other words presented in the experiment. The three groups of single-solution anagrams (Table 1) were selected after pretesting a larger list with a sample of 100 psychology students. The groups of anagrams were matched for difficulty ($\overline{X}$ solution rate in pretests = 48-50 percent) and approximate frequency in written English (8). The 30 words other than anagram cues appearing on the focal and peripheral lists were also matched to the anagram lists for frequency of occurrence.

TABLE 1
ANAGRAM LISTS

Focally cued	Peripherally cued	Uncued
ALVET	GTIAN	NIJOT
RAPPE	SLDAA	LINAF
LDNBA	YLDIE	EEGES
NGRBI	ETTEH	CITHK
ROKBO	VIRER	NKCKO
PYRUS	BRACS	MESOC
METSS	KINRD	WOETL
NATRI	LUTPI	HETIW
CIKBR	TEIBS	DUGFE
CHARN	NAWPS	OGEDD

C. RESULTS

The number of solutions of focally and peripherally cued anagrams were analyzed in two 3 (levels of scanning control) × 2 (levels of field articulation) × 2 (sex) analyses of covariance with uncued anagram solutions as the covariate. Scanning control (SC) and field articulation (FA) were virtually independent ($r = .10$), and for the latter variable there were no sex differences (Males: $\overline{X} = 46.9$, $SD = 10.9$; Females: $\overline{X} = 45.1$, $SD = 10.3$; $F < 1$). However, males ($\overline{X} = .73$, $SD = 1.17$) tended to overestimate the size of the standard in comparison with females ($\overline{X} = .36$, $SD = 1.14$; $F = 3.78$ and $F_{05} = 3.84$). Because of this borderline difference, SC classification cutting points were computed separately for males and females. *S*s were classified as high scanners ($\overline{X}$ constant error $< .22$ [males] and $< -.16$ [females]), moderate scanners (.21—1.26 [males] and —.16—.88 [females]), and low scanners (> 1.26 [males] and $> .88$ [females]) and as either highly field articulated ($\geqslant 46$) or as poorly field articulated ($\leqslant 46$).

In order to have equal size cells, 30 *S*s were randomly discarded. Prior to the analysis of covariance, a three-way analysis of variance of uncued anagram scores was conducted. A significant FA × Sex interaction ($F_{1,108} = 4.64$, $p < .05$) was found. Anagram solving skill was related to FA for females ($\overline{X}_{\text{high}} = 5.5$, $\overline{X}_{\text{low}} = 4.2$; $F = 5.232$, $p < .05$) but not for males ($\overline{X}_{\text{high}} = 4.0$, $\overline{X}_{\text{low}} = 4.5$; $F < 1$). Since analysis of covariance requires independence between the experimental factors and the covariate, female *S*s in the two FA groups were matched for uncued anagram solving score. Thus the final design was a three-way ANCOVA with ten observations/cell in which female *S*s were matched for anagram solving ability.

1. *Scanning Control*

As predicted, SC was linearly related to peripheral cue utilization ($F_{\text{linear}} = 5.00$, $df = 1{,}107$, $p < .05$, $F_{\text{nonlinear}} < 1$). High scanning *S*s solved significantly more peripherally cued anagrams ($\overline{X} = 5.65$), than did low scanners ($\overline{X} = 4.84$, $p < .05$), while moderate scanners fell in the middle of the distribution ($\overline{X} = 5.18$) and were not significantly different from either extreme group ($p < .20$). The predicted relationship between scanning control and focal cue utilization was not found ($F_{1,107} = 1.378$). Though low scanners solved fewer focally cued anagrams ($\overline{X} = 5.58$) than did the other two groups, the means of the moderate ($\overline{X} = 6.09$) and high scanners ($\overline{X} = 6.09$) were identical. In light of these findings, hypothesis *b* was not tested.

2. *Field Articulation*

Significant Sex by FA interactions were found for both focal ($F_{1107} = 4.991$, $p < .05$) and peripheral ($F_{1,107} = 15.514$, $p < .001$) anagrams; for neither type of cue were significant FA (*F*s < 1) or Sex ($F = 1.141$, $F < 1$, respectively) main effects found. Comparisons of cell means (Table 2) revealed: (*a*) Focal and peripheral cue utilization is positively related to FA for males (p's $< .05$ and $< .005$), while for females it is unrelated to focal cue utilization ($F = 1.33$) and negatively related to the use of peripheral cues ($p < .025$). (*b*) While low FA females are better cue utilizers than low FA males (focal $p < .025$; peripheral $p < .005$), high FA females utilize peripheral cues less than high FA males ($p < .025$).

TABLE 2
ADJUSTED MEAN ANAGRAM SOLUTIONS: FIELD ARTICULATION BY SEX

Anagrams	Sex	Field articulation Low	 High
Focally cued	Male	5.93	6.92
	Female	7.08	6.51
Peripherally cued	Male	4.50	5.87
	Female	5.74	4.77

D. DISCUSSION

The effective deployment of attention interpretation of previously reported personality-cue utilization relationships (6, 7) receives only partial support in these data. The finding of a linear relationship between scanning control and peripheral cue utilization is consistent with the attention deployment interpretation of previous results. However, the implications of this interpretation lead to the expectation of a relationship with focal cue utilization as well. Interviews with some *S*s, while admittedly unsystematic, provide a suggestive explanation for the absence of results with focally cued anagrams. It was reported that during the interval between their solution of an anagram and the presentation of the next one, the focal list was rehearsed in anticipation of a recall procedure. While in these data, as in Mendelsohn and Griswold's, memory for the word lists does not account for the independent variable—cue utilization relationships—the rehearsal process could well make the focal cues more readily available to all *S*s thus obscuring the operation of cognitive scanning. In that case, only the factor of selective attention would be associated with individual differences in focally cued anagram solution.

The present data also offer curious sex differences. As anticipated (2), there was no relationship between field articulation and anagram solving skill in males ($r = -.11$, NS). This measure of effective attention deployment, however, was related to both focal and peripheral cue utilization with men. Unexpected were the findings for females. For not only was field articulation related to anagram solving ability ($r = .33$, $df = 81$, $p < .01$), but it was negatively related to peripheral cue utilization in a subsample of females matched for anagram solving ability. Unlike the earlier sex differences which appear primarily in the magnitude of relationships, here a reversal appears. As Mendelsohn and Griswold (7) noted in their discussion of the *R* related sex difference, personality measures may be associated with different characteristics in the two sexes (1). There is evidence as well of sex differences in the organization of abilities (9). At present it can only be speculated that field articulation measures, such as the Concealed Figures, have different covariates in males and females; replications and extensions of the present study are necessary.

The present experiment suggests that at least two independent dimensions of cognitive organization, in interaction with situational (type of cue) and organismic (sex) factors, affect performance in a problem solving situation. The determinants of these interactions, especially for field articulation, are far from clear.

E. SUMMARY

After memorizing 25 words (focal list) while another list of 25 words (peripheral list) was played in the background, *S*s were required to solve single-solution anagrams. Unbeknownst to them, the solutions for some of these anagrams were words appearing in the two lists. Scanning control was linearly associated with solution of peripherally cued anagrams, but not with solution of focally cued anagrams. Field articulation was positively associated with cue utilization in males but not with females. Tentative explanations of these inconsistencies were offered.

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BETTER-ADJUSTED PEERS AS RESOURCES IN GROUP THERAPY WITH ADOLESCENTS*[1]

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A. INTRODUCTION

The possibility of using peers for developing social responsiveness in the less well-adjusted or less skilled has long been recognized. The experience of one of us (J.R.H.) goes back to the Child Guidance Nursery in the Yale Clinic of Child Development under the direction of Dr. Arnold Gesell in the early 1930's. (4) This nursery school group was deliberately composed of half well-adjusted and outgoing children and half those whose problems had brought them to the clinic. The skill with which some of the better-adjusted children managed the psychological situations can be illustrated by the way one very disruptive child was incorporated into group play. This youngster was hyperactive, noisy, and destructive. A four-year-old who was skilled in directing group play assigned him the role of a barking dog stationed outside the gate when the rest of the participants were in the house. Having an assigned role appropriate to his energy level, he jumped up and down and barked as the others came and went in the roles they found congenial. Who but a peer would have thought of this ingenious solution which permitted as much inclusion in the group play as this boy was capable of?

We shall not spend time on the vast literature of group therapy except as it refers to the utilization of a more adjusted peer group in the treatment of patients. A peer group naturally moves in the direction of emphasizing activities which peers can participate in together. In a contribution on child therapy, Slavson (10) recognized the need for what he called a "transitional group," and suggested that the inclusion of more integrated peers into a group could bring ego strength sufficient to keep impulses in check and regulate be-

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havior. He then sharply distinguished the transitional group, which he defined as having organized activities, officers, and minutes from the psychotherapy group. As will be apparent, our study departs from Slavson's concept by emphasizing the major contribution which more adjusted peers can make to therapeutic goals in a psychotherapy group.

In the last decade, college student volunteers have been widely used as an adjunct to treatment of the mentally ill. The most extensive of these programs involved the use of 2000 Harvard and Radcliffe undergraduates as volunteers in a large public mental hospital over a period of ten years. Because beneficial results were reported in this program but no systematic evaluative data were available, Beck, Kantor, and Gelineau in Boston (2) compared two wards with long-term chronic patients—one a control ward and the other a ward where patients were exposed to groups of volunteer college students in discussion and activities over a period of 18 months. The investigators found a statistically significant though small increase in social behavior. The college group could scarcely qualify as peers, for the average age of the patients was 47 and that of the students was 20. Nevertheless, our project on a small scale bears some similarity to the Boston one.

Kantor and Greenblatt (8) reported good results from the Wellmet Project, a coeducational cooperative half-way house in which patients and students lived together on a family model. Again, there was disparity in ages between the two groups.

An interesting project is reported from Wyoming (7). Eight male adolescent patients from the Wyoming State Hospital were included as regular members of the National Outdoor Leadership School for Boys on a month's mountaineering experience under rugged conditions. Five of the eight patients completed the course; no systematic check-ups were reported.

An increased awareness of the therapeutic potential of the peer culture is in the air. It is impossible to go into the many studies; among them are residential and summer day camps for disturbed children (1, 5) and play activity groups (3).

Peer groups are used as a positive approach to the treatment of adolescents in many new programs, such as the Job Corps, the Howard University work training and recreational programs, experimental educational programs (9).

In addition to efforts which appear formally in the literature, for many years there have been less formal but effective efforts on the part of concerned groups such as YMCA, YWCA, Girl Scouts, and Boy Scouts.

B. The Planned Summer Group

The immediate stimulus for our group project arose as a way to give further help to six boys who had been in an affiliative therapy program (6). The prior program was designed for boys in early adolescence with major difficulties in relation to people. It had involved a coordinated psychiatric approach over the preceding two years, with the addition of a so-called "affiliative therapist" who was a Stanford student and who was expected to form a strong relation on a reality basis with the patient through participation in activities. In assessing our results, we felt that six of the seven boys from this project had made such progress that they were ready for a "half-way" house in social relations with peers. Four boys had shown marked improvement in relation to adults but were still withdrawn *vis à vis* peers. Competitiveness in a fifth boy still interfered with his relationship to age mates. The last boy lacked self-confidence with peers in spite of general gains.

Reflection led us to the conclusion that the social skills essential for satisfactory peer relationships were missing for these boys and that we had some responsibility to try to supply them. The results were so dramatic that we propose to report the procedures in some detail.

The summer group was composed of ten boys. As has been mentioned, six came from the treatment program; these six constituted the *treatment* group.[2] Another four were chosen because of their ability to adjust to peers; we shall refer to them as the *adjusted* group. These four were selected from seven referred by the coordinator of work opportunities for students in the school district, following interviews by the project staff. The two groups are identified as such only for purposes of data analysis; no distinctions were made, within the sessions, between those considered better-adjusted and those less well-adjusted.

The group of ten boys, two college leaders (Len and Dan), and the director, skilled in group therapy, met on the University campus three times a week for a three-hour session over a period of eight weeks. A bus carried the boys either to a swimming pool or to one of the parks where it was possible to play baseball and volleyball. An hour was spent in activities, followed by a 15-minute refreshment period (soft drinks, cookies, doughnuts), and then an hour in discussion. The first part of the discussion period was spent in two small groups of five each with varied composition, under one of the two col-

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[2] The seventh boy, a delinquent, did not seem appropriate for this particular group.

TABLE 1
THE SIX PATIENTS, MEMBERS OF THE TREATMENT GROUP

Patient	Age	School grade level	Original diagnosis before affiliative therapy	Gains made through affiliative therapy	Relationships to peers at the beginning of summer group
1. Mike	15	10	Adjustment reaction adolescence	Self-confidence and perseverance established. Learned to control tics and nervousness. Reduction of over-involvement in parents' troubles.	Peer relationships established, but well below potential.
2. David	16	10	Schizoid personality	Much improvement in hypochondriasis. Able to participate in sports. No longer the subject for ridicule by peers.	Still fearful and separate toward peers, except for a tendency to lecture in monologues. Defensive attitude. No personal friends.
3. Bob	17	11	Schizoid personality	Learned to focus on game activities and conversational interactions with therapists, and parents. Developed trust. Learned to develop responsibility and plan for his future.	Able to relate to one peer only, for occasional activities. Reticent and shy with others.
4. Roger	16	11	Sexual deviation (transvestism)	Marked reduction in hostility toward parents; able to accept father. Transvestism stopped. Competitive rigidity lessened with therapist.	Able to interact with peers but only as a competitor in sports activities. Tendency to be serious and rivalrous.

TABLE 1 (*continued*)

Patient	Age	School grade level	Original diagnosis before affiliative therapy	Gains made through affiliative therapy	Relationships to peers at the beginning of summer group
5. Dick	16	10	Schizoid personality	Developed ability to focus on activities and gained certain skills. Overcame phobias. Learned to separate phantasies from reality and to see himself as a person apart from mother. Gained tolerance for father.	No friends at all. Saw self as special and different from peers. Fearful of aggression in self and others. Isolate.
6. Jerry	15	9	Inadequate personality (passive/aggressive)	Attention on tasks and goals increased. Distracting maneuvers and wish for spotlight diminished. Focus on others improved by end of treatment but still a problem at start of group Rx.	Little peer interaction. Inappropriate clowning as attention-getting and distancing device. Insensitive to reactions from peers.

lege leaders. Then the large group met as a community review of the small group discussions, with the director in charge.

After the boys had departed, the director and the two college leaders met for discussion of the day's events. They then made plans for the next meeting. There was also a weekly staff meeting to discuss progress.

A more detailed account of the program and the types of interactions which it encouraged, will emerge from the case histories. Briefly, the objective of both the sports activities and the subsequent discussions was to build missing ego skills which were needed for successful peer relationships by the treatment group. It was expected that the well-adjusted boys who already possessed a wide range of such skills could function as models in an atmosphere of mutual respect and interest. Such an atmosphere could be attained through insistence that criticism be of a constructive nature. The rating scales, to be described later, forced attention to such ego skills as humor, capacity to speak interestingly, and ability to listen to others.

The disturbed boys had been followed long enough in therapy that there was little likelihood of substantial gains over a few weeks without some kind of intervention. Therefore it was not felt to be essential to establish a control group, in accordance with more conventional experimental design. In any case, disturbed boys with prior experience of affiliative therapy would not have been available as controls. We have therefore had to rely upon internal evidence of progress instead of comparison with a group handled in some alternative fashion.

1. *The Treatment Group*

Table 1 presents, in condensed form, a description of the six patients who made up the treatment group. As we have already noted, all had shown marked improvement in relation to adults as a consequence of the previous treatment but still presented problems in relation to peers. The degree of difficulty which they were experiencing will be clearer when two illustrative cases, those of Dick and David, are discussed in detail later in this report.

2. *The Better-Adjusted Peers*

Because it is unusual to include well-adjusted boys with a patient group, we feel it is valuable to describe the adjusted members in some detail.

Since it has been established that learning can best occur in an atmosphere of encouragement, our goal was to select a group of boys who could implement this philosophy by attitude and action. We developed certain criteria for selecting boys with necessary qualities. These included: reasonably good relationships to peers and parents, interest and enjoyment in sports activities, a sense of responsibility and commitment, ability to share feelings and thoughts, limited competitiveness coupled with a sense of fair play for self and others—in other words, good sportsmanship. The four boys selected reflected these qualities in varying degrees. As the summer progressed, we recognized that the boys represented two different types of models: first, a transitional leadership type, and second, a clear-cut leadership type. There happened to be two of each.

We saw the transitional model as a bridge bringing the withdrawn members closer to the outgoing ones. Ken, age 17, was a friendly, open, sensible, feet-on-the-ground sort of boy. While a bit overweight and lumbering, he showed an interest and willingness to try various activities. He had done some swimming, softball, and volleyball. He had had good relationships with both parents. Since the death of his father two years earlier, he had assumed more responsibility than the usual teenager. Ken and his mother had moved to this area and he had found the adjustment to the new school difficult, both scholastically and socially, but was managing well in both areas. While not actually "popular," he had friendships based on shared interests.

Ken turned out to be not only an attainable model for the withdrawn boys, as we had expected, but also an easy-going enthusiastic participant with them. While he spent most of his time with them, he was well liked and appreciated by the other outgoing boys as well. He was comfortable in both worlds and established a link between them.

He was a good index of deviant behavior in the group, because he was the most tolerant. The few times when he lost composure, the others, sensing that things were really getting out of hand, rallied to his support. One of the college leaders characterized Ken well as follows: "In the game where the object was to hit someone else with a ball, Ken threw the gentlest, still hitting the other person, and was himself hit the least. A gentle, good-natured, popular guy, awkward, the least likely boy to incur aggression by others, though a large, hard-to-miss target."

Fred, age 16, was the peer leader type. He was a pleasant looking boy who had not been involved in team sports or other large group activities, preferring skiing, swimming, and surfing with several close friends. However, he was skilled in all sports, got along well with others, and had shown an interest in helping younger children through volunteer work. His quiet competence and easy-going type of humor turned out to be a major asset for our group. He was a boy who had "no front." Fred could be casually humorous at his own expense. For instance, when complimented on his baseball, he said, "but I fall flat on my face when there are women around." This remark assisted rapport between him and the treatment boys, who were still scared of girls, but now realized that others also struggled with this problem.

From the beginning Fred was able to relate casually to the more withdrawn boys, much more than they could with one another. He promoted a feeling of self-confidence through his camaraderie. Not only did he demonstrate pleasant interactions, but during discussions he was the first to set an example of how to accept criticism. In summary, one of the college leaders described him as an ideal model for relaxed participation; he could lead, but did not dominate and was popular rather than envied for his excellent qualities.

3. *The College Student Leaders*

Both college leaders were successful and experienced recreational assistants from our affiliative therapy project. Both could identify with the adolescent's problems and culture without losing track of their own identities and responsibilities. Each brought somewhat different skills. Len was outgoing, optimistic, honest, bluntly direct, and group oriented. His athletic skills, extroverted sense of humor, and good sportsmanship were useful in team sports. Dan was gentle, sensitive, quietly humorous, subtle, and more individually oriented.

Dan had been seeing two of our patients in individual recreational therapy and Len was seeing the boy who was so competitive. These three boys needed to learn how to share their therapists, and this did indeed happen.

4. *The Professional Director*

One of us (D.C.S.) served as the director who was present during the entire afternoon. His role was primarily that of an observer during the games. As a person trained in group therapy, he was in charge of the discussions which followed these games. There was a close liaison established between him and the student leaders.

C. THE PLAN

1. *Announced Purpose and Goals*

The project was explained to the participants as a paid scientific study—"a research project at Stanford about how communication can be developed among individuals who are quite different." There was no identification of treatment boys as different from adjusted boys. All were selected as individuals and both treatment and adjusted boys were paid for trying to understand each other. We did not think we could secure our choice of high school boys, average age

16, for the summer unless we paid them and we were convinced that the calibre of the individuals would be crucial.

At the first meeting, the group was told of purposes and goals. An orientation statement given by the director to the boys presented the philosophy:

"Our summer group is made up of ten boys and two college leaders. This is a research project at Stanford about how communication can be developed among individuals who are quite different. Young adults frequently form subgroups which tend to exclude anyone who doesn't quite fit in. As a result, those who are different often don't get to know each other. If you only accept people who are just like you, you are less apt to find out what others have to offer. Each person was chosen because he is different from somebody else. The differentness provides us with the subject for our task: namely, how well can ten people who are different, understand each other and learn a sense of belonging together."

He then went on to explain the activities they were to participate in, and the evaluative procedures that would be followed.

2. *Rating Scales*

Rating scales were devised for sense of humor, leadership, clothes and general appearance, helpfulness, awareness, being good for the group, ability to speak interestingly, and ability to be a good listener. Each consisted of a ten-point scale, arranged as a "ladder of skill" easily checked by the rater. The high and low ends of the scales were labeled by appropriate descriptive phrases and the average also noted, to provide reference points. Having been cautioned about the confidentiality and privacy of the ratings, each boy rated himself and each of the other boys twice, once at the end of the second week, after they had been together long enough to be acquainted, and again at the end of the seventh week, after changes had some chance of being detected. The rating scales served a dual function: first, a measurement of change, and second, but equally important, a sensitization on the part of the boys as to what was valued. The leaders prepared ratings at the same time.

3. *The Structured Interview*

One month after the summer ended, Dr. John Adams, who was unaware of the group's composition and purpose, apart from knowing that it was a group therapy project, interviewed the boys and their parents via a structured interview. In addition, there were periodic, though informal, check-ups on progress of the treatment boys for one year.

D. Results

We shall now discuss the overall results in terms of changes in ratings, the structured interview, and two representative case studies.

1. *Changes in Ratings*

The ratings by the leaders, averaged over the eight scales, early and late, are shown in Figure 1 for the individual boys, and serve to indicate the general trends over the summer.

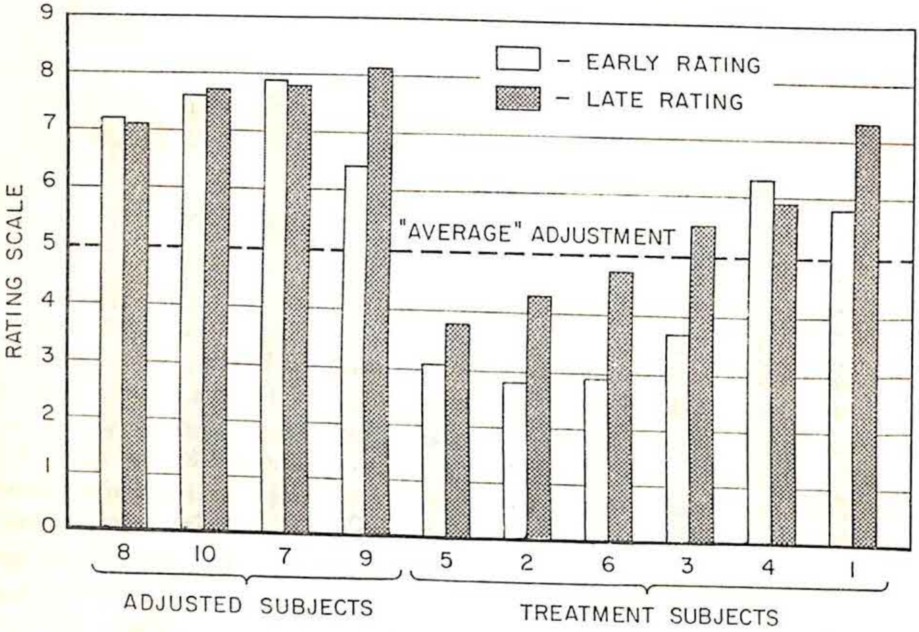

FIGURE 1

Early and Late Ratings of Individual Subjects (Adjusted and Treatment): Means of All Ratings by Leaders

The adjusted subjects are on the left. Their ratings are, as might be expected, considerably higher to begin with than those of the treatment subjects on the right. For the most part the adjusted subjects show little change in rating between the early and late ratings, except for Subject No. 9, who began the lowest of the group and ended the highest. This change indicates the possible beneficial effect of this kind of experience, even for a boy selected as "well-adjusted." The ratings of the other adjusted boys all remained high.

With respect to the treatment subjects, there are clearly two groups. The last two subjects on the right contrast with the first four. In advance of the summer we recognized the strengths of these two treatment boys, and we had looked on them as possible Junior Counselors, as belonging to a middle adjustment group. Subject No. 4 is the boy mentioned earlier as able to participate with peers but in a narrow context of competitiveness. Subject No. 1 is the boy who had real potential for depth in peer relationships but had not been able to realize it. The four boys in the middle, subjects 5, 2, 6, and 3, are the isolates for whom the group and the scales were primarily designed. If we direct our attention to them, we see that they started quite low, around the 3 level, and five weeks later had made gains. Dick, the first case to be described later is Subject No. 5, and David, the second one, is Subject No. 2.

Although the leader ratings have been reported in Figure 1, the results of peer ratings yielded essentially the same data. The rank order correlations between average leader rating and average peer rating on each of the eight scales varied from .49 to .99 for the early rating (mean correlation, .77), and from .55 to .97 for the later rating (mean correlation, .75). While with but 9 ratings to be compared (because the self-rating by each boy was excluded) correlations can be expected to be quite unstable, the fact that they were all positive, and mostly high, suggests that they were describing social reality.

Some interesting patterns developed for individual boys, but the overall results suffice to indicate the movement that took place during the summer's experience.

2. *Interview Findings*

One month after completion of the summer project, Dr. John Adams, who had not been involved in the project and knew nothing about its purpose and design other than that it had something to do with group therapy, conducted a structured interview with each of the boys and his parents. The interview with each boy lasted an hour and a half, while the interview with the parents was a relatively short one of approximately half an hour. The interview outline is not reproduced here because of the limitation of space.[3]

Dr. Adams' initial comment was of considerable interest to us. He stated that with only one exception, all of the boys were able to respond effectively for an hour and a half to a complete stranger who was asking many questions. What they described was very active involvement in the summer program. All of the treatment boys and several of the adjusted described significant changes in their view of themselves and in their behavior with others which they ascribed to the summer group experience. Interviews with the parents generally confirmed the boys' reports.

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[3] It is available upon request.

The main topics of the interview were: (*a*) the boy's perception of the group, and his recollection of what he had been told about the purpose of the group; (*b*) which activities had been found most useful and which least useful, which enjoyable and which unpleasant; (*c*) self-changes as a function of group participation; (*d*) specific changes associated with the various topics of the rating scales; (*e*) self-comments on his popularity.

The comments proved to be very revealing, and confirmed what had been found in the ratings. For example, such comments as these were made in reply to questions bearing on self-changes as a function of group participation. "I learned how to meet people better; I've done a better job with kids I've met later. Also, I'm less critical of new people I meet, I judge less on surface things. For example, one of the boys in the group had been in my school. I had always thought he was a clod, but now I know he's a nice guy." One of the quite withdrawn boys commented: "I found I could participate much better than I thought." When asked how he felt that others in the group saw him at the end: "I think they saw me as a pretty nice guy—about equal to them." He felt that adults also responded differently to him. "They're friendlier, because I talk more, and because I'm less critical and see more good points in adults, as well as others."

In the interview with the parents, all commented on their sons' great involvement with the program. It was interesting how relatively little the boys had told their parents of the day-to-day activities of the group, and several parents reported that their sons had told them, apparently with some pride, that such details were "confidential." The parents of the treatment boys uniformly reported behavioral improvement, with greater social activity on their sons' part and decreased friction in the home.

3. *Two Representative Case Studies*

We have selected for case study two of the treatment boys who received very low ratings at the beginning of the study, and, although they had gained were still lowest at the end. It is important to distinguish between "improvement" and "cure." As we shall see, these boys made very gratifying gains, even though they were still rated below all of the others in their general social adjustment.

a. Case 1. Dick (Subject No. 5, Figure 1). Before the summer group began, Dick, now age 16, had been in our affiliative therapy program for one and a half years. During this time he had made much progress. He had changed from a borderline psychotic boy to one who had begun to conquer many of his fears. He had achieved a more normal relationship with his parents, accompanied by a growing feeling of separateness and independence from them. He could function adequately in school and with teachers.

The one area where Dick had not been able to bridge the gap to normal adjustment had been in making friends. We had introduced first one, then another, high school boy to join him and his therapist on outings, but these peers had not been seen as equals nor as personal friends.

Dick benefited in many ways from the group experience but only some of the highlights can be presented. At the beginning he was fearful of physical exertion. He possessed a self-concept of specialness and privilege. No ordinary rules, standards, or expectations in relation to his contemporaries applied to him. By the end of the summer there had been many changes.

It took longer for him to learn that his inner concerns and preoccupations were to some degree also experienced by his contemporaries. During one of the structured discussions, the topic was arguments and disagreements. Dick volunteered an observation regarding the frequent arguments with his brother. Two other boys added their experiences and Mike suggested a method by which arguments could be avoided. It was agreed that if a younger brother called you a jerk, you could let that go, state your position clearly and walk away without precipitating further trouble. Mike then said, "Well, now that we have a good idea on how to handle brothers, what do you say, Dick? Are you going to try this with your brother?" At first Dick just sat there, so Mike repeated his question until Dick said he would.

It is interesting to note that after the summer, during the structured interview, Dick referred to a change in attitude toward his brother with far fewer fights.

Dick made progress in all sports activities. In baseball he was at first awkward, uncoordinated, and fearful of the ball. Yet from the start the most competent athlete in the group, Walt, encouraged him. "Go ahead and catch it; if you don't catch it, I will." This set the stage for Dick to begin trying to participate without self-consciousness; he got support from other teammates even when he missed.

Throughout the summer, whenever one of the successful boys treated Dick in an easy-going way as an equal, his physical stance changed and he moved with more self-confidence. He strode to position on the ballfield instead of creeping there. Dick's progress in game participation continued, due in large measure to the encouraging atmosphere. By the end of the summer he was working hard and no longer looked out of place in a ball game.

Dick's lifelong water phobia had been overcome through affiliative therapy with a Stanford student to the extent that he could swim with a dog paddle

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Dick's lifelong water phobia had been overcome through affiliative therapy with a Stanford student to the extent that he could swim with a dog paddle in a private pool. The water phobia, however, reasserted itself in the presence of a group of peers. For the first two weeks he avoided going into the pool; finally during the seventh meeting under pressure from the college leaders, he went in but immediately got out again, dangling his legs over the side until told, "All the way and stay in the pool." At first he looked scared and resentful; however, he gradually began to involve himself in the Marco Polo game and lost some of his angry fugitive look. He was included in the game, although the group respected his limited participation. Finally, Sam, an adjusted boy, tagged him. Dick had to be IT. Sam helped him fill this role. Dick learned to yell out "Marco" and received the response as everyone else did when they were IT; the others shouted back "Polo." At that moment Dick was just like any other boy; though he played cautiously, he succeeded in tagging Bob, a treatment boy who had made himself easily available.

Following his new achievement in the pool, Dick later that afternoon participated more in the discussion and in informal conversations. During the next meeting he got into the pool faster, knowing it was expected of him.

We skip now to the sixth week of the group meetings when some business had to be transacted at the outset. This took longer than usual, and Dick became fidgety. Encouraged to say what was on his mind, he muttered, "Aren't we going into the pool today?" The director agreed that Dick had expressed everyone's question and it was time to break for a swim.

On the last day at the pool he was the first one changed and in the water. He splashed others playfully, was a full participant of the Marco Polo game with no help needed or given, and he even dogpaddled over to the deep end where he had sighted some girls.

As the last week approached, it was clear that although Dick had made progress, he still did not fully involve himself with others in discussion and that a more forceful measure was needed. One day after group members had commented on his inattentiveness, the director asked Dick if additional feed-back such as psychodrama, which had provided another boy with information about himself, might be helpful to him. Dick responded in a noncommittal way. Len, one of the college leaders, said he would play-act Dick; he did this well, with all group members furnishing comments on how Len had to look and act to personify Dick. This included the facial expression of a drooped lower jaw, eyes glazed, eyebrows raised and eyes staring off into space.

Dick was both fascinated and taken aback. On being questioned whether in Len's characterization he had noted his tendency to repetitiousness and withdrawal, he became uneasy. He acknowledged that he had not previously realized the extent to which he used repetitive, meaningless phrases. It was obvious that he was deeply affected by what had occurred. During subsequent meetings, Dick's tendency to stare into space was almost nonexistent, he kept his mouth closed and his eyebrows in normal position. He seemed determined to take part in the discussions.

Dick made friends with other group members; two of them remained good friends and he sees them regularly. One of them is a treatment boy, the other is an adjusted boy. It is the first time in Dick's life that he has had friends of his own age.

Almost unanimously, group members named Dick as having made the most progress, particularly in speaking and listening. We quote one of the adjusted boys: "In the beginning he hardly spoke at all; later he had good things to say. He became able to see things and he helped by bringing out his personal experiences that were pertinent, and showed he was thinking." Another boy remarked, "Dick learned to joke; he had been withdrawn at first, then it was as though he had waked from sleep."

During their structured interview with Dr. Adams, Dick's parents were enthusiastic about the gains he had made during the summer. They felt he had achieved a feeling of self-confidence, had become more aware of what others looked for and might be saying, dressed more like others, could take jokes directed at him, spent time with his friends from the group, and was growing more independent of the family.

In spite of this glowing report, we must be realistic. Dick will continue to appear somewhat different from others because of an aloofness and certain limitations in a competitive world.

b. Case 2. David (Subject No. 2, in Figure 1). When David had been accepted at age 14 into the affiliative therapy program, he was a complete isolate. He had been subject to exclusion or to cruel ridicule by peers and for this reason he had become fearful of other boys. In addition, he tuned out his eighth grade classes by immersing himself in either fantasy or science fiction books. Science fiction in many aspects seemed real to him. David participated very little in physical activities and always found excuses for not taking part: "My leg hurts today . . . my finger is sore."

By the time the summer program began, David had made considerable progress. Physical complaints had dropped out. Ridicule from other boys had almost disappeared. Some problems, however, persisted. He still had not made personal friends at school. He was preoccupied with life in outer space, such as flying saucers and people from other planets, and was given to long monologues about these topics with the result that little interaction in discussion with peers was possible. He showed a consistently defensive attitude toward criticism from both teachers and peers.

During the summer we saw David making progress in four areas.

1. Personal friendship developed at first on a one-to-one level, and subsequently David became part of a threesome.

2. Awareness of others increased, accompanied by a lessening of the self-centered preoccupations.

3. In athletics, genuine and uninhibited involvement in play with peers gradually emerged.

4. David developed some acceptance toward criticism and a willingness to be thoughtful about himself. Earlier he had been extremely defensive and when criticized he had thought others were against him.

We are going to give excerpts in David's own words from the interview after the summer session closed. When asked in what ways the group experience had affected him the most, he said, "I used to spend most of the time reading; now I'm more interested in other things. I spend more time with people and explore my surroundings. I'm more self-confident, I can talk to people better. I can speak a little more interestingly and listen better. I'm more alert to what people say. I had to be alert in those discussions. I had to learn to watch others in the fishbowl groups."

Next we hear this boy who had been fearful and suspicious say, "All the group were really nice and I assume they thought the same of me."

Where would he most wish for further improvement? David answered, "A sense of humor." And where did he think the group felt he made the most progress? "In my sense of humor. I went along with jokes they played on me a little better toward the end." He thought he was lowest in leadership skill. "I don't like to lead, and I'm also scared of it."

In summary, we see that David, forced to focus on others by having to report on their behavior, recognized that he had been helped to become more alert to them; forced to reflect on how he looked to others, he became more realistic about the impression he was making. He had learned to feel better about himself in a friendly, tolerant atmosphere.

The parents said what impressed David most was that all of the guys in the group were good guys. When asked about changes, they continued, "He is generally much more aware; he listens more to people. He used to just walk away when others were talking, or interrupt. He enjoys people at school. He acts as though he'll get a fair deal; he's happier with himself. He used to be afraid to try to make new friends. Now he's not so afraid. He makes an effort to get out and see boys."

4. *One-Year Follow-Up of the Six Treatment Boys*

a. Dick (Subject No. 5). For the first time, Dick, who was described as our first case study, has a life of his own with two friends from the group with whom he goes on bike rides, and has long discussions on every conceivable subject from science fiction to the world situation to philosophy. He enjoys visiting their homes, and observing the ways other families live.

His school counselor advised us that in complete contrast to former years, he is hardly ever picked on by other boys. Dick no longer wants to avail himself of special excuses to avoid activities he fears. He wants to be like others; for example, he reassured himself by talking to his PE teacher about a forthcoming unit on wrestling and then took his chances. He has relinquished much of his earlier need for special status.

b. David (Subject No. 2). David, who was described as our second case study, has continued his friendship with two boys from the group and, in addition, has a good friend from school. The four boys frequently get together for activities. The school reports considerable progress; David is aware of other boys and knows their names. Other boys accept him. He attends school dances.

c. Jerry (Subject No. 6). Jerry was the one member of the group whose lack of rudimentary social skills and extreme insensitivity made his inclusion in the summer program questionable. Unlike the other boys who had been in affiliative treatment for periods ranging from 15 to 18 months, he had experienced it for less than one year. Affiliative therapy resumed after the summer program so that subsequent gains which became apparent are difficult to attribute to either program rather than to both.

It is the impression of those who have worked closely with Jerry that the summer program did produce changes. In the fall, Jerry verbalized concern about what other boys thought of him where before he was a law unto himself. He wondered what made his sister so well liked by others, where earlier he had expressed only jealousy of her. He is now aware of the consequences of his behavior on others. He is reflective about himself in relation to others. He respects rules in a game or in sports and fits in as a member of a team instead of indulging in antics of an exhibitionistic nature which effectively eliminated meaningful involvement. He has a small circle of friends.

d. Bob (Subject No. 3). When he entered the summer group, Bob had been able to interact with one other boy at a time in occasional activities. As school resumed in the fall, he made new friends. He now meets them on the way to school, spends most of his weekends in their company listening to records and bands, playing cards, shooting pool, and going on beach trips.

Both parents agreed that a year ago they would not have believed such a social transformation was possible. Then they begged him to go out and see someone. Now they must insist on setting time limits by Sunday night; he is always busy with friends Friday nights, Saturdays, and Sundays.

The picture would not be complete without reference to Bob's awakening interest in girls. While recognizing awkwardness and apprehensiveness, he has gained courage to ask girls to date.

e. Mike (Subject No. 1). Mike, one of the two so-called middle adjustment boys, found in the group an ideal testing ground for his potential, but previously little used, social skills. He has gone ahead and expanded these skills in everyday life. For the first time in his life, he tried out for and made a sport team at school. He has many friends now. He has become a very supportive person to his younger brother.

When he represented a class discussion group and summarized their conclusions in a talk at school, he said he was able to do this only because of his summer experience.

f. Roger (Subject No. 4). Roger, the second of the two so-called middle adjustment boys, had always enjoyed sports but had been unwilling to extend himself enough to get on any team. During the year he became a member of his school's basketball team and worked hard to improve his standing. He was also trying out for track and field teams. He taught his brother to play basketball where earlier he was rivalrous and jealous of him. To friends he frequently reacted with humor rather than with his former competitive seriousness. He also attended school dances regularly.

5. *Changes in the Adjusted Boys*

We have no one-year follow-up of the adjusted group. Assessment of changes in this group are based on observations made during the project and on responses to the structured interview.

Ken, who had found the adjustment to a new community difficult, responded, "Everyone was friendly toward me. I've been in other groups where a wall persisted between kids, but not here." He felt he had made permanent friends with several boys and had made the most progress in awareness. "I learned to see what point people were making—in the fishbowl you had to listen carefully and it almost became a habit. You had to speak so that you made your point clear and useful." His mother evaluated the summer experience as follows: "He has relaxed more this summer than before." There is no doubt that Ken became much more coordinated in physical skill and this produced a more masculine appearance. By the end of summer he looked like a ball player; he threw with strength and could run well. The masculine identification available in the group made a real difference to this boy, who in adolescence had lost his father. Having had to assume responsibility prematurely, he had learned to play more in the spirit of a carefree youngster and to use good natured humor.

Fred said he had not thought of himself as a leader before the summer until he successfully assumed this role in our group. He had learned when to step in and when not to. He also felt he had learned to listen better and his humor had become more thoughtful. Fred's parents volunteered that their son had become more open and direct in his communication with them and that he had matured generally over the summer.

Walt, a leader of leaders, epitomized success in every area. He was liked and admired by all the boys. It was difficult to predict whether as successful a person as he would make gains and if so, in what areas. Yet he did. We have evidence for this from his parents, who stated that after the summer group he had become more understanding and less critical of his less outgoing sister. Often the very successful lack appreciation and tolerance for the less successful.

The last boy, Sam, a friendly open boy with quiet poise, stated that the summer session had helped him become less self-conscious and had enabled him to talk more easily and to listen more attentively. His parents supported this view and mentioned that he could formulate and share his thoughts better with them and in addition was showing a new willingness to become involved in the interests of others. Our own observations emphasize another gain for this normally so responsible boy. Sam had learned to forget himself in carefree play. For example, during an outing, on the spur of the moment he climbed a tall redwood tree, and in order to scale the first 20 feet of branchless trunk, he moved with the coordination of a South Sea Islander.

It is gratifying to know that the adjusted boys not only provided so much but also gained from their experience. They learned to sharpen their leadership skills and to increase their sensitivity to self and others. Given the structure and climate of the group, they also learned to re-experience the spontaneous play of childhood, which is sometimes lost in the strivings toward adult responsibility.

Both the treatment and adjusted boys expressed a wish to work in a similar program. These populations are present in most communities and, given the right conditions, we suggest that they can benefit from one another.

6. *The Therapeutic Use of Constructive Social Interaction*

Having presented a picture of the group activities and their outcomes, in part through ratings, in part through individual cases, we wish now to reflect upon some of the features of the group process that appeared to us to be responsible for the therapeutic effectiveness of group activities in which well-adjusted peers interact with those in need of treatment.

a. The contagion of enthusiasm. In the pool we saw many examples of spontaneous and free playfulness. On several occasions some of the boys—including both the treatment and the adjusted—were involved in a sea-otter type of play with much laughing, shouting, pushing, and kidding. Another illustration concerned Dan, the college leader who, no longer mindful of being a leader, became playful as he floated in the fetal position announcing, "This is very relaxing. Have you ever tried the fetal position in the water?" (Oh, yeah?) "Yes, it also gets rid of all those childhood problems." At this point everybody roared and Dan demonstrated birth, or what he called the "freedom leap," as he shot out of the water. Everybody got into the act with varying versions of freedom leaps in a scene of happy abandonment. Even boys not initially involved were caught up in the gay carefree atmosphere of the moment. This is what is meant by the contagion of enthusiasm.

b. Improved perception of self and others through mandatory observing and attending. An informal atmosphere for observing and paying attention was present and became part of the group atmosphere or culture. There was also a more formal demand that people share themselves. Two of the formal techniques were the fishbowl discussions and the ladders of skill rating scales.

The fishbowl technique was introduced the second week. Initially, this involved assignment of the boys into two subgroups. One group was given the task of discussing a given topic, while the other, situated in an outer circle, observed the discussion and subsequently reported. These groups then reversed positions and functions. Two weeks later this technique was refined further by assigning each boy another boy in the opposite group. The assignments were based on the director's impression as to which individual would be most helpful in observing a particular person. First Len and Dan, the two college leaders, demonstrated feedback with each other, then Len provided a critical but constructive feedback for one of the treatment boys, thus setting the stage for the way a critical observation could be made in a positive way. Len asked Dick if he was paying attention. "Dick, I noticed that you were following the discussion but at times you looked as though you were thinking of something else. Were you, at times?" This enabled Dick to acknowledge that he had been inattentive. The next meeting, one of the adjusted boys asked Dick the same question about his inability to listen. By the following time it was noted that Dick was more attentive and able to participate.

Within a week of the introduction of this technique, the adjusted boys were doing an outstanding job in constructive criticism. Shortly thereafter, the most able of the treatment boys gave excellent feedback to another treatment boy: Mike told Bob that he hardly ever said anything in the group but that when he did say something, it was good. Shortly after, we noticed Bob was participating more.

The second technique, ratings of self and others, was introduced at the beginning of the third week. This forced each boy to observe and evaluate his companions and himself along the prescribed guidelines. He thereby became clearer in regard to which interpersonal skills were valued. When these same tests were readministered toward the end of the summer, the boys appeared to be more relaxed and able to understand the dimensions; at this time there were also comments reflected in humorous exchanges which clearly indicated that they hoped others would see their progress.

The extent to which members had become aware of another member's personal problems, coupled with a desire to help that individual, showed up in psychodrama. One boy, Jerry, had demonstrated an almost complete inattentiveness to other members as indicated by not remembering any names long after names were used by everyone else. He stayed outside the group, clowned, and attempted to draw attention to himself. He had successfully resisted many genuinely helpful attempts by the boys who had tried to devise ways whereby he could pay better attention to them. Gradually the group exhibited increasing concern and annoyance. Jerry admitted that he was unable to recognize how his behavior looked or affected others. At this point the director introduced psychodrama as a method of helping him visualize and comprehend his problem. One of the adjusted boys volunteered to take the role of Jerry while the rest of the group assisted by furnishing many spontaneous suggestions as to how to act in order to portray Jerry realistically. The group, using an almost exact replication of earlier dialogues, enacted the way they had felt and behaved toward Jerry. There was such genuine involvement that the play almost lost its "as if" quality. For the first time Jerry focused directly. Speechless, there was astonishment in his face. His inappropriate clowning and grimacing, which had served as a way of distancing him from the group, were absent. In subsequent meetings one could see how he tried to pay attention, though he often failed. However, when someone would tell him to stop his silliness, he complied. He also sat more with the group. This is the boy who, at the end of the project, said, "If you ever have another group like this, please let me know. I want to be in it. You don't even have to pay me." It should be added that Jerry was the only boy whose inclusion in the group we had questioned. He had been the last to be accepted in our affiliative therapy program and he had not progressed to the point of focusing for any length of time outside himself. In spite of the enthusiastic statement above, we feel that group life affected him less than any of the others.

c. Identification as an aid in developing social skills. Len's capacity for sportsmanship, camaraderie, and humor on the ball field provided a model for the boys and it became the prevailing way to interact during activities. First the adjusted boys picked it up and used it with one another, then they reacted with the treatment boys in this fashion, and lastly the treatment boys adopted it with each other. Throughout this sequence, Len remained very active with everyone in an encouraging way. His kind of "talking it up" was adopted generally.

An early discussion also serves as an illustration of this point. After one of the adjusted boys had spoken of a personal experience, a withdrawn boy was able to mention an experience he had had. This was in regard to hurt feelings. He observed, "Some people have a shell around them so they can't get hurt. When you try not to think about hurt feelings, you do so even more."

d. Development of identification with the group. Transition from a consideration of the self as most important to a consideration of other selves as equally important constituted one of our goals. About three weeks were needed for some of the more cautious members of the group to realize that genuine friendship and good will on the part of peers prevailed and could be counted on.

In the beginning we could see three different sets of boys: Four withdrawn boys, who looked similar to one another, formed no group. At the other end were three outgoing, competent, and successful boys, who formed a group. In the middle were three, two of whom were treatment boys who had progressed a great deal through affiliative therapy and one who was an adjusted boy who identified more with this intermediate group.

During the first week when the boys had been given free rein to choose any discussion topic, they introduced ideas like "weight and buoyancy of different cereals." This was an index of early testing in regard to the purpose of the group. Following a few of these experiences, it was decided to assign discussion topics based on the concerns that had been manifested during the preceding meeting or were pertinent to this age group. Some of these topics were: hurt feelings, self-confidence, talking straight and talking around, arguments and disagreements, internal authority and external authority, self-expression, constructive criticism, separation and loss, friendship, humor, and feedback. During one of the last meetings, when the boys were asked to select their own topic for group discussion, their choice of "fear" illustrates the degree to which a shift toward responsibility for serious discussion had taken place.

By the beginning of the third week, group cohesiveness became evident in many ways. At the sixth meeting, the topic was confidentiality: how much would group members talk on the outside about what went on in the group? In the thoughtful discussion which followed, the boys evolved standards of responsibility and were obviously proud to be involved in a special project where certain rules were needed. This discussion served to weld the group together and aided individual loyalty and commitment to it. From the interviews with parents later in the fall, it was apparent that all of the boys had carefully observed these standards.

It was interesting to us that the cooperative spirit in the games which needed to be carefully organized and guided in the beginning became second nature. We compare two sessions, one during the second week and one toward the end of summer. On both occasions Len, who did so much to promote and coordinate athletic activities, was absent. On the first occasion, the group was unable to organize the planned baseball game because of indecision and bickering. In contrast, on the second occasion when Len was absent, group members took over with easy cooperation and organization and with no direction from the other college leader. This included the treatment boys almost to the same extent as the adjusted ones. We cannot resist citing the observation of a stranger who happened by and was so intrigued by what he saw that he asked for some explanation and was in turn interrogated about what he was thinking. "Those boys are so well organized in spite of such a great variety. Some of the boys are well coordinated; others aren't. Some look healthy, others frail. There's no apparent leader, but such cooperation."

e. Sensitivity to the problems of personal closeness and separation. The group director's absence of two weeks, from the tenth through the 15th meeting, resulted in a variety of problems. The college leaders temporarily became indecisive and inconsistent as they reacted to the loss. The adjusted boys were sensitive to these changes and became uncertain. The treatment boys were the most affected. Some became more withdrawn and some turned on each other. Standards and group cohesiveness, which had just begun to jell, suffered markedly. There was less attentiveness, less positive feedback, and far less responsibility.

It was fruitful to talk about reactions to separation and loss. In the discussion over loss of the director, Ken, the adjusted boy who had lost his father two years before, shared his feeling over this event. After he had taken the lead, all of the boys except one followed suit in relating experiences they had had of losing someone: i.e., grandparents, a cousin, or a family friend. Through discussions and through the reassertion of leadership by the college leaders, resolution of problems related to group disorganization began to occur before the director's return. As soon as the college leaders reassumed leadership, the adjusted boys responded immediately. They took responsibility, for example, by setting limits to destructive behavior and to scapegoating which had appeared. Two "hold-outs" furnished material for further discussions with more complete understanding and resolution after the director's return.

During the last week, and particularly during the last meeting, when it was noticed that certain members showed a subdued quality and sadness, the discussion was directed toward sadness over separation. It is significant that at the last meeting, while exploring tide pools on the beach, members of the group never separated. When one or two boys went in a new direction the others followed, with an amoeba-like quality. On the bus ride home, Dan on the guitar and one of the adjusted boys on the harmonica played mournful folk tunes. Everyone was involved in this.

After arriving home, one of the adjusted boys took the lead in shaking hands and saying good-bye. Within seconds this snow-balled as everyone pumped everyone else's hand and said good-bye.

E. Concluding Remarks

The possibilities for personal growth through participating as accepted equals in a group of diverse social competence—including well-adjusted peers, as well as others with personal problems—have been demonstrated and explained through the therapeutic use of constructive social interaction, the contagion of enthusiasm, and the sensitizing of perception of self and others through mandatory observing and attending. The needs of one disturbed boy are not those of another, and what is required for his comfort with others and acceptance by them cannot be predicted with any precision. Here the interaction with others who have solved their personal problems in the diverse ways we call normal come to the rescue by providing varied models of social behavior as they are needed. The inclusion of the normal peers has this advantage over the usual therapy group in which all members suffer some deficiencies in social communication and participation. By arranging group participation so that there were no contrasts between the "ins" and the "outs," there emerged a general level of tolerance to criticism, a social awareness, and the development of a sense of humor.

Significant in this growth were some processes best described as identifications: identifications with *individuals* as an aid in gaining skills, as well as identifications with a *group* in understanding and learning cooperative behavior. Simultaneously, sensitivity to problems of personal closeness and separation developed with a minimum of apprehension.

Although these processes were observed in the special situation of these particular boys, the behaviors are of a kind not limited to one age or sex, and what we have observed might well apply to groups of individuals differing widely from these in age and circumstances.

F. SUMMARY

This was a program designed for boys in early adolescence who had major difficulties in relating to peers. Of six treatment boys, four were very withdrawn and two had experienced little satisfaction in groups. To provide more adequate skills in interpersonal relationships with peers, four well-adjusted boys were selected to complete the group. Two college seniors and a director skilled in group therapy provided leadership for the project. Meetings occurred three times a week for three hours each session over a period of eight weeks. Both activities and discussion stressed the development of ego skills essential for peer interaction. Such ego skills included ability to listen to others, ability to speak interestingly, awareness of others, openness, humor, and constructive criticism. All of the treatment boys made marked gains. Follow-up one year later showed a continuation of these changes and in some instances a marked ability to move into new areas. Assessment of the adjusted boys one month after the project ended, showed that they, too, had profited.

The course of personal growth is attributed to the therapeutic use of constructive social interaction, the contagion of enthusiasm, and the sensitizing of perception of self and others through mandatory observing and attending. These possibilities were opened up through the presence in the group of those with a wide range of acceptable skills (the adjusted boys) along with those somewhat deficient in those skills (the less-adjusted boys) in an atmosphere of mutual respect.

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BEHAVIOR IN A THREE-PATH MULTIPLE-CHOICE ELIMINATION PROBLEM UNDER CONDITIONS OF OVERTRAINING*[1]

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A. PURPOSE

Two intermittent concerns in the psychology of animal learning, the phenomenon of spontaneous alternation in the rat and the specific movement learning *vs.* cognitive map learning issue, are relevant to the present research investigation.

1. The empirical finding of spontaneous alternation can be traced to Tolman who in 1925 reported a consistency in the behavior of rats ". . . a very pronounced tendency toward regular alternation . . . . toward variation of response . . . a positive tendency in and of itself" (10, p. 290). More than a dozen years later, Dennis studied intensively spontaneous alternation and reported "a tendency to avoid a specific pathway which has recently been traversed" (1, p. 310). Many theories to account for the alternation phenomenon have been conceived, usually in terms of stimulus satiation or in terms of curiosity (1, 2, 8, 9).

2. Among the major issues relating to the controversy between stimulus-response theories and sign learning theories many years ago was whether the organism learns correct movement sequences or whether the organism learns sign-significate relationships or meanings. Stimulus-response learning theorists, such as Hull, maintained that the animal learns specific acts or movements (3, 4); sign learning theorists, such as Tolman, maintained that the animal learns signs toward a goal; i.e., the animal follows a map and learns a behavior route (11, 12).

Experiments designed to test the efficacy of response learning *vs.* cognitive map learning were developed and data acquired; however, the issue was never

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conclusively resolved and, in recent years, has not been a major focus of attention.

A third avenue of relevance to the present investigation concerns studies involving elevated multiple-path elimination problems in which the solution to the problem required that subjects select on consecutive runs successively different paths, the choice of paths being free: i.e., not controlled by the experimenter. Results for both a four-path (5) and a five-path problem (6) indicate that (*a*) subjects can solve the problem, (*b*) they do not adopt any particular sequence of path elimination which is repeated from day to day: i.e., they do not stereotype, and (*c*) on successive runs, subjects tend to select pathways which diverge most from each other; i.e., subjects select a succession of pathways in which each correct choice diverges maximally in space from the correct path previously chosen.

The latter finding appeared to be related to the earlier discovery of spontaneous alternation. In fact, that finding suggested the hypothesis that *spontaneous alternation in the two-path situation is simply a specific manifestation of a more general behavior tendency in the rat, namely, the tendency to choose on successive runs, paths which diverge maximally from each other*. By virtue of the physical nature of the two-path apparatus, such divergency in behavior is of necessity limited to alternation. The simplest kind of situation above the level of the two-path problem which would permit testing the hypothesis of a general behavior tendency in rats to display maximal divergence—i.e., to choose on successive runs, paths which diverge maximally from each other—is a three-path problem. Accordingly, to acquire data relevant to this hypothesis, a three-path problem was devised and a methodology developed in which the order of path elimination was determined by the subject.

In addition to testing the major hypothesis cited above, two other purposes of the present research were to ascertain *under conditions of extensive overtraining* (in which all subjects were given a total of 200 trials although the poorest learner required only 36 trials to achieve criterion): (*a*) Whether subjects, while maintaining high accuracy of performance in solving the problem, develop stereotypy in the sense of rigid preference for any specific pattern of response or whether a variety of response patterns are employed. (*b*) Whether decision time is modified: i.e., reduced or increased.

B. METHOD

1. *Subjects*

Subjects were 11 albino rats, about 90 days old and experimentally naive at the beginning of the research.

2. *Apparatus*

The apparatus consisted of an elevated circular platform from which three paths radiated, adjacent paths being separated from each other by 30 degrees (30°). Each path was five feet long and three inches wide. Eight inches from the distal end of each path was an obstruction plate in which was located a closed door that could be locked or unlocked by the experimenter without this fact being visible to the observer. Behind each door, food was located.

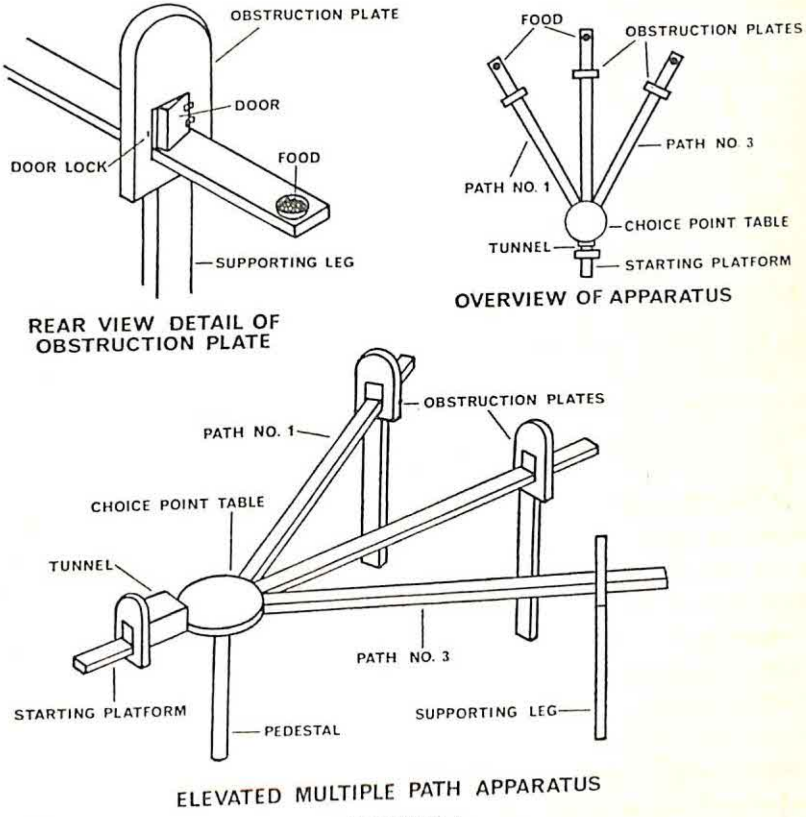

FIGURE 1
ELEVATED THREE-PATH APPARATUS

3. *Procedure*

About two weeks of preliminary training was given to familiarize animals with pathway running and negotiation of obstruction plate doors. The problem for the subject in the investigation was to choose three different paths in any sequence on three successive runs each day. The order of elimination of paths was determined by the subject. After each run the door in the obstruction plate on the path chosen was locked. Animals were run on a 23-hour to 25-hour deprivation schedule. The learning criterion was choosing three successively different paths on each of four consecutive days. Subjects were run for 200 days.

A simple index of adjacency and divergency (preference for contiguous and noncontiguous patterns) was developed which is applicable to situations with any number of paths. Divergency is specified in terms of degree of difference in orientation on successive runs. For example, in the sequence 1-2-3, choosing 2 after choosing 1 is one degree of divergence and choosing 3 after 2 is another degree of divergence, a total of two degrees of divergence. But in the sequence 1-3-2, choosing 3 after 1 is two degrees of divergence and then choosing 2 after 3 is another degree of divergence, a total of three. All possible path sequences in the three-path problem can be categorized as solutions involving two units or three units of divergence.

C. Results

1. *Learning Rate*

All 11 *S*s attained the criterion of learning. Individual variation in rate of learning was great. The best learner required six trials to achieve the criterion; the poorest required 36 trials; the mean number of trials was 19.4. *S*s were run beyond the criterion; all were run for 200 days. In other words, *S*s were run exactly for 200 trials; the 200 trials include all precriterion and postcriterion performance.

2. *Error Analysis*

A check on the learning criterion supported its adequacy. Precriterion errors average 1.41 per trial; after the learning criterion was attained the average fell to .18 errors per trial—about one-eighth the prelearning rate.

3. *Decision Time*

Postcriterion decisions were made more rapidly than precriterion decisions both for correct and incorrect decisions. Mean precriterion correct and incorrect decision times were 12.2 and 34.3 seconds, respectively; postcriterion correct and incorrect decision times were 2.6 and 10.0 seconds, respectively. Differences are statistically significant (*t* test). Correct choices on the average were made much more rapidly than incorrect choices (the means being 3.5

and 21.1 seconds, respectively). More time was required to commit an error than to execute a correct choice.

4. *Choice Sequences: Stereotypy and Variability*

An examination of the data suggested that there was no stereotypy or predominant preference for any particular path-selection sequence by the group or by any individual.

All *S*s' data displayed success streaks: i.e., consecutive series of trials performed perfectly (without error) after achieving the learning criterion. The poorest animal in this regard had a series of 16 consecutive errorless trials; the best *S* had 67 consecutive trials without error; the mean was 33.

Usually, patterns were different from trial to trial. Occasionally, the same pattern was repeated on successive trials; however, this was infrequent.

5. *Patterns of Divergence*

There were only six patterns possible; i.e., six behavior patterns were permuted on the basis of three independent paths, and these could be subsumed under those yielding a score of two units of divergence and those yielding a score of three units of divergence. The two-unit divergence patterns were 1-2-3 and 3-2-1. The three unit divergence patterns were 1-3-2, 2-1-3, 2-3-1 and 3-1-2. A table is provided to indicate preferences in terms of units of divergence. (See Table 1.)

TABLE 1
SEQUENCES OF CORRECT RESPONSES FOR ALL SUBJECTS DURING 200 TRIALS

Measure	Units of divergence 2 units	 3 units
Specific sequences of paths	1-2-3 and 3-2-1	1-3-2, 2-1-3, 2-3-1, 3-1-2
Absolute number of choices	222	1978
Weighting factor	1/2	1/4
Degree of preference	111	494.5

Since the absolute number of possible patterns varied from one divergence category to the other—that is, there were only two possible patterns providing a divergence of two units and four possibilities for a divergence score of three units—it was necessary to give appropriate consideration to chance; and this was done by dividing the number of actual choices (*actual* response sequences in the data) of a divergence unit by the number of *possible* patterns within that category. Thus, the absolute number of choices for divergence value 2 is divided by 2 and the absolute number of choices for divergence value 3 is divided by 4. This yields scores of 111 and 494.5 respectively, suggesting a decidedly strong preference for divergence over contiguity in the choice sequence of paths on successive runs.

6. *Effects of Overtraining: Comparing Trials 1 to 100 with Trials 101 to 200*

Further, results indicate that with extensive overtraining—i.e., comparing the second 100 trials with the first 100 trials—(*a*) Stereotypy did not develop; the tendency to vary response patterns persisted throughout the last 100 trials, while high accuracy problem-solving level was maintained. (*b*) *S*s continued to display a general preference for divergency (noncontiguous) patterns. In fact, there was a slight strengthening of this tendency during the second 100 trials as compared with the first 100 trials. (*c*) Decision time was reduced for both correct and incorrect responses during the second 100 trials.

D. Discussion

1. *Efficiency of Learning*

The three-path multiple choice problem is readily and efficiently solved by rats. Postcriterion performance in terms of radically reduced error rate supports the idea that the learning criterion was adequate. Efficiency of learning also is supported by data which indicate that postcriterion decision times—both correct and incorrect—are more rapid than corresponding precriterion decision times.

*S*s learned not to repeat; at least they were discouraged from doing so in the research situation. Tendencies toward divergence exist from the beginning, but with training errors and decision times are gradually reduced.

2. *Decision Time*

Correct decisions were made much more rapidly than incorrect decisions, which is consistent with the idea that prior to incorrect runs the *S* is uncertain, bewildered or confused—i.e., aspects of the situation are unclear to the animal—whereas prior to a correct decision there is an absence or at least a lesser degree of such confusion or bewilderment—i.e., a greater degree of certainty.

3. *Effects of Overtraining on Stereotypy and Contiguity*

Despite prolonged overtraining and opportunities for performing beyond the learning criterion, stereotypy in the sense that the animal displays a rigid preference for a particular response sequence did not develop in any *S*. Rather animals learned to solve the problem *not* by a specific set of responses but by learning a principle, and they varied their response sequences from trial to trial, while performing in compliance with that principle: *viz.,* "Choose three successively different paths on three successive runs." Apparently, when there is an opportunity to solve a problem by learning either a rigid sequence of responses or an abstract principle, it is easier to learn the abstract principle.

Not only do the animals not stereotype, but they do not show a *preference* for selecting paths in a *contiguous* 1-2-3 or 3-2-1 order. In fact, the preference is in the direction of noncontiguity. Animals, when given free choice, select successions of paths which tend to diverge maximally from each other. In other words, on the basis of this conception, one would predict that in a four-path multiple-choice elimination problem the 1-2-3-4 and 4-3-2-1 sequences (with three units of divergence) would be least preferred. A sequence such as 1-2-4-3 or 4-3-1-2 (with four units of divergence) would be more preferred, and the sequences 3-1-4-2 or 2-4-1-3 (with seven units of divergence) would be most preferred. This is exactly what has been found (5). And the same preference exists also in the five-path problem (6).

4. *Theoretical Implications and Conclusions*

These findings are not readily reconciled with an S-R reinforcement approach; however, they are not inconsistent with certain notions of Tolman which imply that the organism learns not specific acts or responses but the significance of cues for problem solution or goal direction. It is not the responses *per se* which are learned but certain stimulus meanings, cues, or significances. The variability found in the preferences of these animals is not inconsistent with Tolman's notion of a "cognitive map." *S*s can and do display behavioral flexibility, shifting from one approach to another as circumstances require while maintaining behavior in the direction of the same goal and while performing with a very high level of accuracy.

Evidence from several independent studies has been adduced suggesting a tendency in the rat to avoid paths which it has previously traversed in multiple path problem situations; this finding deserves further research consideration and elucidation.

In conclusion, one implication consistent with this study and the entire series of related researches is the following. The alternation behavior frequently observed and reported for rats in the two-path problem is but a specific instance of a more general principle, now well supported by evidence: *viz., that animals given the opportunity will vary their behavior and tend to choose on successive runs paths which diverge maximally from each other* (5, 6, 7). By virtue of the physical nature of the two-path apparatus, such variability and divergence in behavior is of necessity limited to alternation. Alternation, then, is merely a specific instance of a more general behavioral tendency.

E. SUMMARY

In a three-path multiple-choice problem in which the order of path elimination was not controlled in any way by the experimenter, 11 albino rats were tested for 200 days. The criterion of learning was choosing three successively different paths on each of four consecutive days.

1. All subjects solved the free-choice multiple path problem by attaining the learning criterion in from six to 36 days.
2. Correct choices were made much more rapidly than incorrect choices. Both correct and incorrect choices were made more rapidly before the learning criterion was attained than after it was attained.
3. Stereotyped behavior in the sense that the animal rigidly repeated the same sequence of paths on successive trials did not develop. Rather variation in the pattern of response on successive trials was characteristic of subjects.
4. Subjects exhibited strong preferences for sequences of paths which were not rigidly contiguous (i.e., 1-2-3 or 3-2-1 order) ; the tendency was to select pathways which diverged from each other rather than to select on consecutive runs successive adjacent pathways. Alternation in a two-path problem is interpreted as a specific instance of this general principle.

The findings while not readily reconciled with an S-R reinforcement approach are not inconsistent with certain notions of Tolman which imply that the organism learns not specific responses but the significance of cues for problem solution.

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VALIDATION OF SELF-CONCEPT OF TYPICAL STUDENT AS SUBSTITUTE FOR STUDENT'S OWN SELF-CONCEPT*

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A. Introduction

This study is a portion of a larger research effort (1) concerned with the development and standardization of *The Cornell Learning and Study Skills Inventory* (CLASSIC). It represents a preliminary investigation in the use of a student's self-concept of the typical student as a substitute for his own self-concept through the use of CLASSIC.

CLASSIC is a newly designed study-skills inventory for assisting students to identify problems which may have a direct bearing on their effective (or ineffective) study. It is comprised of 141 items each using a five-point scale, and ranging from 1-seldom, through 2-sometimes, 3-frequently, and 4-generally, to 5-always. For meaningful diagnostic purposes, these items have been grouped into six categories, and which serve as the basis for the six part scores: (*a*) goal orientation, (*b*) activity structure, (*c*) skills in study, (*d*) textbook mastery, (*e*) examination mastery, and (*f*) self mastery.

Twelve of the items on CLASSIC are designed as a reading validity index (RVI). Each of these 12 items is a reversal or partial reversal of a previously included item, and arranged in such a pattern on the form and answer sheet so that they are readily discernible to the informed observer—i.e., item 11 is a reversal of item 10, 22 of 20, 33 of 30, 44 of 40, 55 of 50, 66 of 60, 77 of 70, etc. Accordingly, if a subject marks item 20 as 1-seldom, for example, we would expect him to mark item 22 as 5-always to be in agreement with himself. The idea is that failure of self-agreement most likely stems from not taking time to read the items, but simply placing marks, a practice not uncommon with inventories among college students.

B. Method

1. *Groups Involved*

Four different university and college groups were involved in the study, and with numbers as follows: (*a*) Cornell University 173, (*b*) the Univer-

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sity of Wisconsin-Milwaukee 165, (*c*) Milwaukee Technical College 160, and (*d*) the University of Liberia 50; making a total of 548 subjects. All of the students were presently enrolled in available freshman English courses. All of the groups were about equally divided for sex, except the University of Liberia, which was predominantly male.

2. *Procedure*

In each of the groups CLASSIC was administered as an integral part of the planned course activity, and by the responsible faculty member. Two separate administrations were made with a short period of time between them varying from a couple of days to several weeks. In the first administration, students were asked to make two separate ratings; one depicting their self-concept of the typical college freshman student, and the other depicting their self-concept of the ideal college freshman student. In the second administration students were asked to mark CLASSIC in terms of their own self-concept. None of the students were forewarned that there would be a second administration. Scores were provided the participating faculty several weeks after the administration.

C. FINDINGS

1. *Reading Validity Index (RVI)*

The RVI was used as the basis to eliminate scores for the noneffective readers from the study, and by use of the self rating-self (SR-S) administration of CLASSIC. An arbitrary cut-off of plus or minus one standard deviation (*SD*) from the mean (*M*) was used to identify the noneffective readers. The *M* for the RVI on the SR-S administration was 72.31 with a *SD* of 12.43; so all RVIs below 60 and above 84 were identified as noneffective readers and eliminated from the study. Of the 548 participating students, 143 or 26 percent were eliminated. All data reported in these findings are based on the records of the 405 students classified as "effective" readers.

A comparison was made on all scores for CLASSIC with scores for the noneffective readers included, and with them excluded. For all three administrations the *M*s were smaller and the *SD*s larger when the noneffective readers were included, and the differences were statistically significant at the .01 percent level of confidence. These differences are illustrated in Table 1.[1]

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[1] For Tables 1-8, order NAPS Document 00557 from ASIS National Auxiliary Publications Service, 22 West 34th Street, New York, N.Y. 10021; remitting $1.00 for microfiche or $3.00 for photocopies.

2. *Reliability*

An item analysis was accomplished for the 129 items on CLASSIC, eliminating the 12 RVIs, and by use of the Hoyt's analysis of variance (2). This technique yields an estimated Pearson r for each item against the total score, and with an artificial dichotomy created at the median. The following reliability indices were obtained: SC-I, $r = .986$; SC-T, $r = .983$; and SR-S, $r = .965$. The standard errors (SEs) for the total score were as follows: SC-I, SE = 10.50; SC-T, SE = 10.60; and SR-S, SE = 13.41.

3. *Validity of Total Score on Classic*

The total score on CLASSIC for both the SC-T and the SR-S administrations have statistically significant Pearson r's with most of the variables included in this study, and usually they are generally significant at the .01 percent level. Highest correlations obtain with grade point average (GPA) and the RVI, and the lowest ones are with high school rank (HSR). The GPA was computed for the first semester of the freshman year, and with an earned "A" receiving a value of 4, a "B" receiving a value of 3, a "C" 2, and a "D" 1.

4. *Support for Hypothesis*

By examining the comparisons between *M*s and *SD*s in Table 3 we find little or no support for the hypothesis that the SC-T score could be substituted for the SR-S score. Nearly all *M*s and *SD*s between the SC-T and the SR-S administrations are significantly different, and most of them at the .01 level of confidence. All differences were computed on the basis of t's for correlated data.

In terms of factorial structure all three administrations of CLASSIC have significant common variance, and the hypothesis of the study is accepted, as contained in Tables 4 through 7—i.e., SC-I, SC-T, and SR-S. Each of the separate administrations yields the same six independently organized factors, and which generally constitute the six part scores on CLASSIC. Factor scores for each of the three separate administrations correlate significantly with each other, and at the .01 level of confidence. Factor scores were computed from the rotated factor loadings.

In terms of intercorrelations of the part and total scores for the three separate administrations (illustrated in Table 8) we have equally strong support for the theoretical hypothesis. The Pearson r between the total score for SC-T and SR-S is .415, and the multiple R between the six part scores for the SC-T and the total score for the SR-S is .437. The multiple R for the six part scores of SC-I and the six parts for SC-T with the total score for the SR-S is .510.

D. Discussion

A comparison of *M*s and *SD*s suggests that scores from the SC-T administration of CLASSIC can not be effectively substituted for the SR-S administration. The factorial structure and the correlation of scores suggests that scores for the SR-S administration can be reliably predicted from scores on the SC-T and the SC-I administrations.

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THE RELATIONSHIP OF ORDINAL POSITION, DOGMATISM, AND PERSONAL SEXUAL ATTITUDES*

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A. INTRODUCTION

Ordinal position, or birth order, has long been an interesting but little understood personality variable. Recently, there have been four major articles reviewing the empirical correlates and theoretical constructs of birth order (2, 7, 10, 13). Although there has been no research directly relating birth order with sexual attitudes and dogmatism, a review of certain relevant, closely associated variables follows. From this review predictions about the relationship between the variables will be made.

Kammeyer (7) found that firstborn college girls tended to be more traditional in their orientation toward the feminine role and traditional in their beliefs about the psychological traits of women. He concluded that firstborns tend to be conservators of the traditional culture. Altus (1) derived a scale from the MMPI measuring orientation to the *status quo* and found that firstborns scored higher on this scale. Palmer (9) noted the firstborns characteristically have a shorter duration of interaction with siblings, turn to adults in the absence of other role models, and are more adult-oriented than later borns. He found that firstborns demonstrated greater internalization of parental norms and values.

Although the research on birth order is ambiguous, the majority of evidence seems to support the contention that firstborns and possibly only children differ from later borns in certain ways. There is experimental support for the belief that they are more dependent, conservative, insecure, sensitive to social pressure, and more likely to accept the moral values of their parents (1, 3, 4, 6, 9, 11, 12).

On the basis of these findings, it is hypothesized that firstborn and only children will have more conservative, less permissive sexual attitudes than later borns. It is also hypothesized that firstborns and only children will be more dogmatic than later borns. Males, as previously found by Kilpatrick *et*

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al. (8), are hypothesized to be more dogmatic and have more liberal sexual attitudes than females.

B. METHOD

1. *Subjects*

*S*s were 378 college students at the University of Georgia enrolled in introductory psychology courses. There were 192 males and 186 females in the sample. Most *S*s were freshmen and sophomores, and all *S*s were volunteers.

2. *Procedure*

*S*s were told the nature and purpose of the experiment and required to sign a permission sheet, if they wished to participate. After signing the permission sheets, *S*s were administered form E of the Rokeach Dogmatism scale and a Sexual Attitude Survey (SAS) described in greater detail elsewhere (8). The SAS is an unidimensional scale of sexual liberality. A Sexual Liberality Score (SLS) was computed for each *S* from his SAS, with a high SLS indicating a liberal sexual attitude and a low SLS representing a more conservative sexual attitude. Certain biographical information was obtained, but *S*s were instructed to omit their names from the SAS. *S*s were divided into males and females. Birth order groups were only male ($N = 17$), only female ($N = 21$), firstborn male ($N = 66$), firstborn female ($N = 74$), middle-born male ($N = 58$), middle-born female ($N = 60$), last-born male ($N = 51$), and last-born female ($N = 31$).

A 2 × 4 least squares solution analysis of variance was performed for SLS. Another 2 × 4 least squares solution analysis of variance was performed for dogmatism scale scores (D scores).

C. RESULTS

Table 1 shows SLS means for male and female *S*s in the four birth order groups. Presented in Table 2 are the D scale means for the same groups. Table 3 contains the summary table of the analysis of variance for SLS. Sex ($F = 342.58$, df 1/371) was significant at the $p < .01$ level, and birth order ($F = 2.89$, df 3/371) was significant at the $p < .05$ level. There was no significant interaction between the two variables. Male *S*s had higher SLS means than female *S*s. The Duncan Multiple range procedure (5) was used to determine significant differences between SLS means for birth order groups.

For males, there was no difference in SLS means between only and firstborn *S*s. There was also no difference in SLS means between middle- and last-born *S*s. Only and firstborn *S*s had lower SLS means than middle- and

TABLE 1
MEAN SLS FOR MALE AND FEMALE BIRTH ORDER GROUPS

Sex	Only	SLS Firstborn	Middle Born	Last Born
Male	$\overline{X} = 22.35$	$\overline{X} = 23.53$	$\overline{X} = 24.09$	$\overline{X} = 25.53$
Female	$\overline{X} = 14.24$	$\overline{X} = 13.32$	$\overline{X} = 14.20$	$\overline{X} = 15.29$

TABLE 2
MEAN DOGMATISM SCORES FOR MALE AND FEMALE BIRTH ORDER GROUPS

Sex	Only	Dogmatism Firstborn	Middle Born	Last Born
Male	$\overline{X} = 155.65$	$\overline{X} = 152.12$	$\overline{X} = 157.86$	$\overline{X} = 164.67$
Female	$\overline{X} = 156.86$	$\overline{X} = 158.64$	$\overline{X} = 160.45$	$\overline{X} = 145.06$

TABLE 3
ANALYSIS OF VARIANCE 2 × 4 FACTORIAL FOR SLS

	Source	*Df*	*MS*	*F*
A	Sex	1	9119.39	342.58**
B	Birth order	3	76.80	2.89*
AB		3	11.87	.45
	Within cell	371	26.62	

* Significant at $p < .05$.
** Significant at $p < .01$.

last-born *S*s. For females, firstborn *S*s had significantly lower SLS means than last-born *S*s. None of the other groups had significantly different means.

The summary table of the analysis of variance for D scores is presented in Table 4. Sex ($F = 9.75$, *df* 1/371) was significant at the $p < .01$ level, and birth order ($F = 3.76$, *df* 3/371) at the $p < .05$ level with no significant interaction between the two variables. Male *S*s had higher mean D scores than female *S*s. The Duncan procedure was again used to determine significant differences in mean D scores of the various birth order groups.

TABLE 4
ANALYSIS OF VARIANCE 2 × 4 FACTORIAL FOR DOGMATISM

	Source	*Df*	*MS*	*F*
A	Sex	1	5151.75	9.75**
B	Birth order	3	1988.25	3.76*
AB		3	1315.75	2.49
	Within cell	371	528.29	

* Significant at $p < .05$.
** Significant at $p < .01$.

Male firstborn *S*s had lower mean D scores than only, middle-, and last-born *S*s. *S*s who were only children had higher mean D scores than firstborn *S*s but lower mean D scores than middle- and last-born *S*s. Middle-born *S*s had higher mean D scores than only and firstborn *S*s but lower mean scores than last-born *S*s. The group of last-born *S*s was significantly higher in mean D scores than all other birth order groups.

For females, there was no difference in D score means between only and firstborn *S*s. Last-born *S*s had a significantly lower D score mean than only, first, and middle-born *S*s. Middle-born *S*s had higher mean D scores than only and last-born *S*s. Only child *S*s had lower mean D scores than middle-born *S*s and higher mean D scores than last-born *S*s.

D. Discussion

As predicted, males had more liberal sexual attitudes than females regardless of ordinal position. The effects of ordinal position differed for males and females. As hypothesized, only and firstborn males had less liberal sexual attitudes than middle- and last-born males. The female firstborns had less liberal attitudes than last borns, but the only and middle borns had essentially identical sexual attitudes which were midway between the other two birth order groups.

The males as a group were more dogmatic than the females, but a closer look at the data shows very interesting ordinal position effects. Female only, first, and middle borns were more dogmatic than their male counterparts. Female last borns, however, were much *less* dogmatic than male last borns. The female last borns were, in fact, the least dogmatic of any group, and the male last borns were the most dogmatic. The high dogmatism of the last-born males was great enough to make all males appear more dogmatic than all females, although this was true only for last borns.

Male firstborns were less dogmatic than only, middle, and last borns. This was not predicted and is difficult to interpret in light of research previously discussed (1, 3, 4, 6, 9, 11, 12). Only children were more dogmatic than firstborns but less dogmatic than middle and last borns. Last borns were more dogmatic than all other birth order groups.

For females there was no difference in dogmatism between only and firstborns. Middle borns were more dogmatic than only and last borns. Only children were less dogmatic than middle borns and more dogmatic than last borns. Last-born females were less dogmatic than all others.

An analysis of the data points out the necessity of having separate classifications for only, first, middle, and last borns instead of combining only with firstborns and middle with last borns. The different ordinal position effects for males and females would argue for also further dividing *S*s by sex in future birth order research.

The unexpected but striking difference in dogmatism between male and female last borns deserves additional comment. It should be replicated to insure that it is not an artifact. If replicated, it would suggest very strongly that not taking into account ordinal position in research of dogmatism and authoritarianism may lead to serious confounding of results.

E. SUMMARY

Form E of the Rokeach Dogmatism Scale and the Sexual Attitude Survey were administered to 192 male and 186 female student volunteers. *S*s were further divided into only, first, middle, and last borns. Both dogmatism and personal sexual attitudes were found to be significantly related to ordinal position. The considerably different ordinal position effects for males and females were reported and discussed. An unexpected finding was the striking difference in dogmatism between last-born males and females which was suggested as a possible source of confounding in research on authoritarianism and dogmatism. It was concluded that future research should have separate classification for male and female only, first, middle, and last borns.

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TRANSFER OF TRAINING IN DOGS: EFFECTS OF EARLY TRAINING ON SIMILAR AND DISSIMILAR TASKS IN TWO BREEDS*[1]

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A. INTRODUCTION

A previous report (4) concerned with the determination of critical periods for learning demonstrated that Shetland sheepdogs learned to inhibit movement off a board more readily than basenjis. Although Shetland sheepdogs improved their inhibitory responses with increased age from 4 through 18 weeks, basenjis learned this task better at an earlier age (8-10 weeks) as compared to the later age of training (16-18 weeks). This report extends the previous research to determine the transfer effects of that training on three other learning tasks: leash training, stay test, and Hebb-Williams maze. These tasks can be rated in degree of similarity to the original learning problem with the stay test representing the highest level of similarity and the Hebb-Williams maze being the most dissimilar.

B. SUBJECTS

*S*s were purebred dogs from the colony maintained at Hamilton Station of The Jackson Laboratory. Sixteen male African basenjis from seven litters and 16 Shetland sheepdogs (nine male and seven female) from five litters were used. All pups except for four basenjis were reared with their mothers until weaning at ten weeks of age. These five basenjis were weaned at four weeks of age and reared as a group because they came from litters with one or two pups. Conditions of housing, maintenance, and health care were similar to those of all dogs reared in our colony and have been previously described (3).

At 4 weeks of age, four pups were assigned to each of four training groups so that as far as possible each group represented a maximum number of lit-

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ters. The four training groups were as follows: Group I received training at 4-6, 8-10, and 16-18 weeks; Group II at 4-6 and 16-18 weeks; Group III at 8-10 and 16-18 weeks; and Group IV at 16-18 weeks only.

The inhibitory training task required the dog not to move off a gray board (40 inch × 40 inch × .5 inch) in the absence of an experimenter. The test was done in the home pen where the board was placed in the middle of the floor. The floor of the pen surrounding the board was covered with shavings, so that the footing provided a definite cue when the dog stepped off the board. A choke collar which was connected to a rope pulley system enabled *E* to correct the dog's responses by pulling him back onto the board. Because of the increased size of the dogs at 16 weeks of age, the test board was moved from the center of the pen to a wall, and a heavier choke collar and pulley equipment interchanged. All trials were conducted Monday through Friday during two successive weeks of the ages specified. Dogs that were not being tested during a given two-week period received an equal amount of handling from the experimenter by being picked up, carried down the corridor, and returned to the holding cage in the specified order of rotation.

This training followed a standardized regime to permit good learning. Essentially, the puppy was given an avoidance learning task reinforced by mild punishment and reward. Failure (going off the board) was punished by immediate pulling on the choke collar, and success was rewarded by immediate removal from the situation. Success on a short time criterion was required before the animal could proceed to more difficult trials, and the criterion on the last trial on any day was made equal to that of the preceding successful trial, in order to ensure that the last trial of the day would ordinarily be successful. A more detailed description of the early inhibitory training has already been reported (4).

C. EXPERIMENT I: LEASH TRAINING

1. *Procedure*

After completion of the inhibitory training at 18 weeks of age, dogs were housed in outside pens near the building in which they had been reared. Training to walk on a leash was begun at 19 weeks of age. This test procedure was similar to the one described by Scott and Fuller (3). The goal of training was to get the puppy to walk on a moderately slack leash to the left of the experimenter with its head approximately even with *E*. The dogs were given seven trials or trips during five days with two each on the first two days. Trips were divided into two parts, going and returning. The measure of performance used was the number of balks. This was defined as the dog stopping and refusing to go further. When *S* balked, *E* stopped for a few seconds, started forward, pulled the dog forward for two or three feet, and continued to walk if the dog got to its feet and went ahead. If *S* did not go ahead, it was pulled to a maximum of ten times on any one part of the trip. If this score was attained, the dog was lifted and carried over the course.

a. Day 1. All dogs in a litter were removed from their pen and placed in individual holding cages near the opening of the home pen. Each dog was allowed to sniff a dish of canned dog food placed at the opening of the home pen. *S* was then carried 50 feet away, the leash put around its neck, and the dog was led back to the gate of the home pen where it was fed. All members of the litter received two trials with the order of testing rotated for each trial on this and subsequent days.

b. Day 2. Same as Day 1 except that *E* placed the leash around the dog's neck at the doorway of the pen and led it both going and returning on the 50-foot course. A dish of food was carried by *E* and the dog was fed at the end of the "going" trip. A second trial was administered as on Day 1.

c. Day 3. Same as Day 2 except that the course required the dog to be led through doors and buildings to a position opposite the inside pen in which it was reared. *S* was then fed there. *E* did not carry the food pan on this day. The dog was then led back to the outside pen.

d. Day 4. Same as Day 3.

e. Day 5. Same as Days 3 and 4 except that the course was now extended to include climbing stairs. *S* was led over the same course to its inside home pen and then up a flight of stairs to a room in which it was fed. The dog was then led back over the same route to the outside home pen.

2. *Results*

Figure 1 shows the mean number of balks over all trials for basenjis and Shetland sheepdogs as a function of their differential early inhibitory training. Analysis of variance of these data demonstrated that there were no significant differences between breeds ($F = 3.05$, $df = 1/24$, $p =$ N.S.), between treatments ($F = 2.41$, $df = 3/24$, $p =$ N.S.), nor their interaction ($F = .96$, $df = 3/24$, $p =$ N.S.). However, it did appear that Shetland sheepdogs as a group had more difficulty in leash training as evidenced by a greater number of balks than basenjis. Because the inhibitory training procedures involved different amounts of previous training, the combined scores of Groups I + II + III were compared to Group IV that had only received training at 16-18 weeks. For both breeds (see Figure 1), Group IV was evidently the worst group. The difference on this comparison was significant for both breeds. For the basenjis, the obtained t value was 1.84, $df = 14$, $p < .05$; while for the Shetland sheepdogs, the obtained t value was 2.24, $df = 14$, $p < .025$. These p values were based on one-tailed tests.

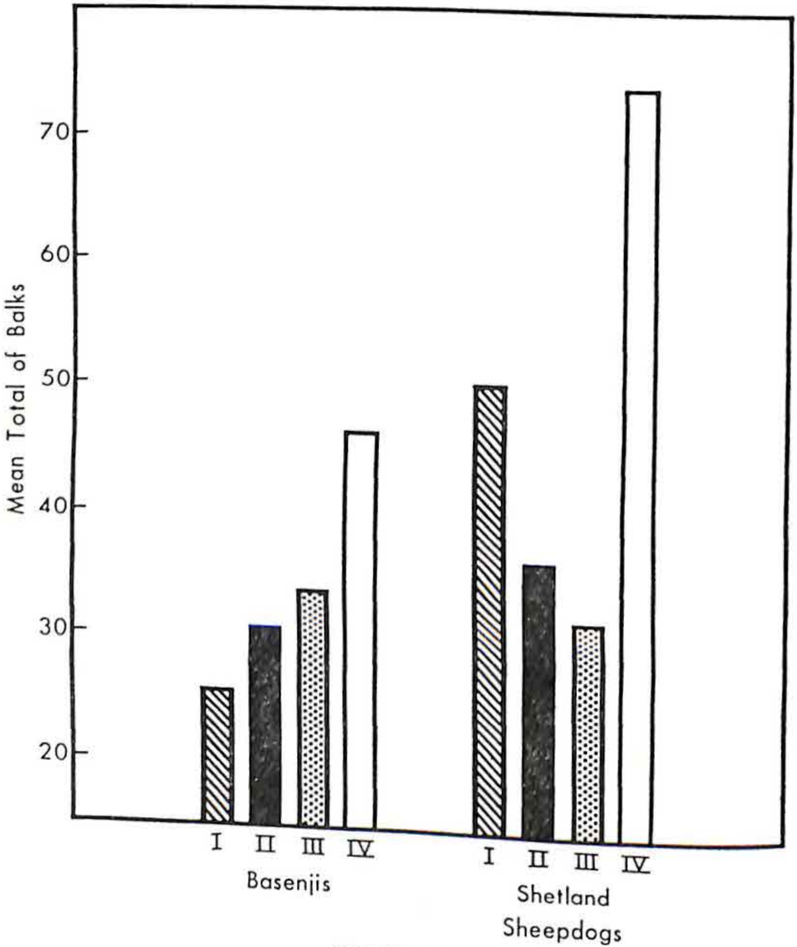

FIGURE 1
MEAN NUMBER OF BALKS IN LEASH TRAINING OVER ALL TRIALS

D. EXPERIMENT II: STAY TEST

1. *Procedure*

During the 25th week of age dogs were tested for their ability to stay on a board in the presence of *E*. *S* received one trial per day for three consecutive days. Previous inhibitory training on a very similar task was done with a minimum of contact between *E* and *S*. The equipment and position of the board used at the 16-18 week inhibitory training test was the same for this test except that the test was not done in the home pen. The gray board (40 inches × 40 inches × .5 inch) was placed against a wall and shavings were placed around the board.

a. Day 1 and 2. Dogs of a given litter were confined in holding cages near the experimental area. Fifteen minutes of adaptation were allowed before testing began. *S* was placed on the board and the choke collar placed around its neck and adjusted so that it could not get entirely off the board. The command "STAY" was given and *E* backed to a position three feet away from the board. For 60 seconds the command "STAY" was given every five seconds and every time *S* made an attempt to leave the board. After 60 seconds the number of commands was recorded and the animal was returned to the holding cage.

b. Day 3. The dog was placed on the board but the choke collar was not put on. However, the pulley system was left intact. *E* gently held the animal on the board and commanded "STAY" every five seconds for 20 seconds (five times). *E* then backed off slowly to the standing position, saying "STAY" two more times every five seconds to 30 seconds. *E* remained standing quietly after this 30 second period. The dog's latency to leave the board was recorded. If the animal did not leave the board after the 30 seconds, it was allowed to stay for 300 seconds (total of 330 seconds). Three successive trials were given. If *S* left the board, it was retrieved, allowed to become calm, and tested again.

2. *Results*

Figure 2A gives the mean number of times *E* said "STAY" to the dogs during the first two days' trials for the two breeds of dogs that received differential early inhibitory training. The number of stays reported consisted of the incidents when the animal left the board and the 13 stays that coincided with the five second time intervals. Analysis of variance of these data showed that basenjis required significantly more corrections or "stays" to keep on the board as compared with the Shetland sheepdogs ($F = 7.26$, $df = 1/24$, $p < .05$). There was no effect of prior inhibitory training ($F = .69$, $df = 3/24$, $p =$ N.S.), nor an interaction between breed and prior training ($F = .78$, $df = 3/24$, $p =$ N.S.).

A comparison between the combined groups (I + II + III) and Group IV

Day 6 of the training trials). From Day 7 to Day 9, a problem was given once; thus, two problems were given daily. The order of testing the dogs was rotated each day. An animal was allowed five minutes in which to solve the problem. If *S* had not solved the problem within this time, it was guided to the food box, allowed to eat, and removed from the maze. The dog was allowed to eat all but a very small bit of food, taken out, and replaced in the start box. The second run was given in the very same manner except that the animal was removed to the holding cage. Coaxing the dog was allowed when *S* failed to approach the goal box only during the training trials, since this period was designed to shape the dog's response to approach the food dish.

Test trials consisted of 12 problems. Two problems were given daily until the 12 problems were completed. The order of dogs was rotated and the total time allowed in the field was five minutes. The procedure was the same as with the training trials except that no coaxing was allowed and errors were counted as the animals traversed the field. An error was scored each time an animal's two forefeet crossed into an error zone. Where a blind alley contained two error zones, two errors were scored if *S* crossed the second error line, but none were scored if it emerged from the alley through the first error zone. However, if a dog emerged from an error zone with both forefeet, turned around and went back, a further error was scored. The total number of error zones entered was the dog's error score. In problems 11 and 12 an error was scored whenever an animal, going in any direction, crossed a line. The double zone in problem 11 was scored as all other double error zones.

2. *Results*

Figure 3A shows the mean latency to leave the start box over all the test trials on the Hebb-Williams maze for the two breeds of dogs that received early inhibitory training. Analysis of variance of these data demonstrated no significant difference between breeds ($F = .34$, $df = 1/24$, $p =$ N.S.), between prior training conditions ($F = 1.35$, $df = 3/24$, $p =$ N.S.), nor their interaction ($F = .28$, $df = 3/24$, $p =$ N.S.). Furthermore, comparison of the combined groups (I + II + III) with Group IV also yielded insignificant results (basenjis, $t = .79$, $df = 14$, $p =$ N.S.; Shetland sheepdogs, $t = .32$, $df = 14$, $p =$ N.S.).

Figure 3B shows the mean time to complete the maze over all trials on the Hebb-Williams maze. Analysis of variance of these data demonstrated that Shetland sheepdogs required significantly longer to complete the maze as compared to basenjis ($F = 9.22$, $df = 1/24$, $p < .01$), and that prior inhibitory training resulted in significant effects ($F = 3.42$, $df = 3/24$, $p < .05$). Breed

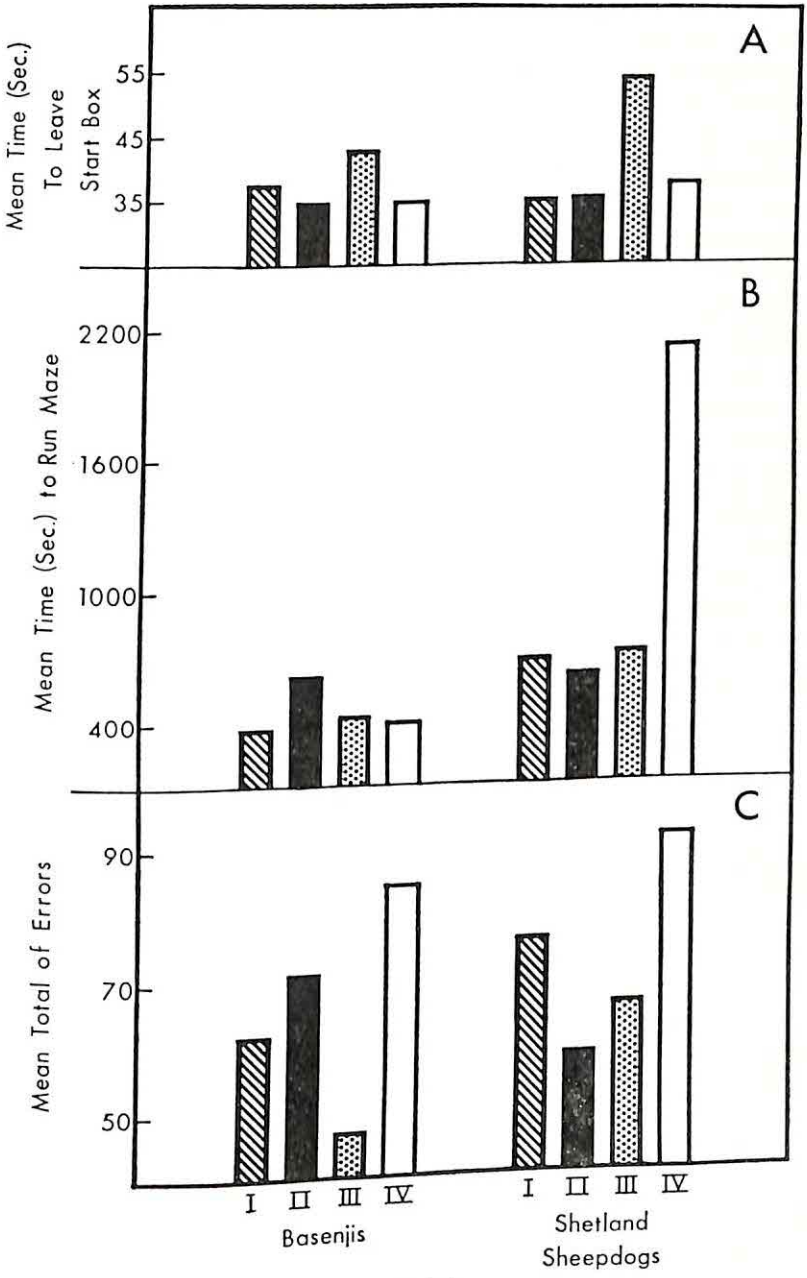

FIGURE 3
PERFORMANCE ON HEBB-WILLIAMS MAZE OVER ALL TRIALS: MEAN TIME IN SECONDS TO LEAVE START BOX (A); MEAN TIME IN SECONDS TO RUN MAZE (B); AND MEAN TOTAL ERRORS (C)

of dog and prior training interacted significantly ($F = 4.28$, $df = 3/24$, $p < .05$). This was the result of Shetland sheepdogs having longer time scores in Group III and IV while basenjis had longer time scores in Groups II and III.

When comparisons are made of the combined I + II + III groups with group IV, only the Shetland sheepdogs showed the significant cumulative effect of the prior training (basenjis, $t = .45$, $df = 14$, $p =$ N.S.; Shetland sheepdogs, $t = 2.03$, $df = 14$, $p < .05$).

Figure 3C shows the total error scores obtained on all trials of the maze test. Analysis of variance of these data demonstrated no significant effects of breed ($F = .30$, $df = 1/24$, $p =$ N.S.), prior training ($F = 1.29$, $df = 3/24$, $p =$ N.S.), nor their interaction ($F = .35$, $df = 3/24$, $p =$ N.S.). Although the trend of data shows group IV to have the highest error scores for both breeds, a *t* test evaluating the combined groups I + II + III with group IV yielded inconclusive results (basenjis, $t = 1.48$, $df = 14$, $p =$ N.S.; Shetland sheepdogs, $t = 1.21$, $df = 14$, $p =$ N.S.).

F. Discussion

The results have demonstrated that on all three learning tasks there was little overall transfer effect from the animal's previous training. When effects of prior experience were observed, they occurred in comparisons between the group that had the least amount of prior experience (group IV, training at 16-18 weeks only) and the other groups that had two or three training experiences (group I had three; group II had two; and group III had two). The amount of previous early training may have been a determiner of the animal's performance on subsequent learning tasks. Differences (similar to those observed in the initial inhibitory training study) between the two breeds of dogs were present on all of the three learning tasks. The behavior of the Shetland sheepdogs was more cautious, more inhibited, and more responsive to environmental stimuli than the basenjis. This was evidenced by the Shetland sheepdogs' manifesting more balks on the leash training task, more time on board on the stay test, and requiring longer to complete the Hebb-Williams maze.

The results of breed differences are consistent with previous results with similar tests, even though the variance within breeds would be expected to be increased by differential training.

Previous work (3) showed that dogs could be readily trained on the leash at 18 weeks of age provided they were given some preliminary training in following. Basenjis and Shetland sheepdogs were very similar with respect to the number of balks, the measure used in this experiment, and the results are thus quite comparable.

In an obedience test (3) which required the animals to learn to stay on a box or leap down from it on command, basenjis tended to be hyperactive and uncontrollable, while Shetland sheepdogs were well controlled either when staying still or moving on command. This test was most similar to the stay test in the present experiment, and the results are quite similar.

In a previous experiment by Elliot and Scott (1) these breeds were compared on a six unit T maze rather than the Hebb-Williams maze test used here. There were no differences between basenjis and Shetland sheepdogs on time and error scores, but basenjis were superior performers in the speed of the initial trial, minimum running time, and minimum error scores. The results with the Hebb-Williams maze gave significant breed differences only in average running time, with the basenjis being faster. The results are thus in the same direction as with the other type of maze.

With respect to the effects of differential early training, animals in the original inhibitory training test were given equal amounts of handling and contact with the experimenter so that all animals had equal opportunity to become socialized to human beings. Therefore any differential results cannot be attributed to this factor but rather to differences in the amount and time of training. The original results (4) indicated that the initial response to inhibitory training was most favorable in basenjis, if begun at 8 weeks of age rather than at 4 or 16 weeks of age. It would be expected that if this reaction permanently affects later behavior it would be most likely to affect the stay test and the leash test, which were most similar to the original training, one involving the use of the same board, and the other involving the use of the leash under different circumstances. There was no indication of experiential effects in the stay test, and in the leash test the group of Shetland sheepdogs which performed best on inhibitory training (those initially trained at 16 weeks) performed most poorly.

It was expected that there would be the least transference of training on the Hebb-Williams maze, this being most unlike the original training task. Here again it was the Shetland sheepdogs initially trained at 16 weeks that received the poorest scores. It does not seem likely that both these effects were produced by transfer of training, since they were produced in tests where very unequal transfer would be expected. Rather, this result may be attributed to the time of initial training, delayed training presumably being preceded by the acquisition of interfering learning sets.

G. Summary

This experiment was designed to determine the long-term effects of early inhibitory training on later learning of three different tasks in basenjis and Shetland sheepdogs. The three learning tasks were leash training, stay test, and Hebb-Williams maze. These tasks were chosen to represent different degrees of similarity to the original learning problem with the stay test representing the highest level of similarity and the Hebb-Williams the most dissimilar. Although no clear demonstration of transfer effects was evident, dogs receiving the least amount of early inhibitory training, also at the older age of 16-18 weeks, performed more poorly on almost all of the later learning tasks. Breed differences continued to be evident on these tasks with the Shetland sheepdogs performing best where their behavior patterns were consistent with the task requirements, such as the stay test, and more poorly on the other tests where their high degree of emotional reactivity interfered with learning the appropriate responses.

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CHARACTERISTICS OF VOLUNTEERS AND NONVOLUNTEERS FOR PSYCHOLOGICAL EXPERIMENTS*

Departments of Psychology, Ohio University and Slippery Rock State College

L. K. WATERS AND WILLIAM E. KIRK

A. INTRODUCTION

A large number of psychological experiments with human subjects have utilized volunteer samples of college undergraduates. Meaningful generalizations from such experiments require that the volunteer subjects be representative of at least the subject pool. Several investigators (e.g., 3, 12, 14, 15) have raised questions concerning the representativeness of volunteer subjects and have compared volunteers and nonvolunteers on a wide range of personality and biographical variables. About two-thirds of these studies have reported differences between volunteers and nonvolunteers (1, 3, 5, 8, 9, 10, 12, 13, 14, 15, 16, 17, 18, 20, 23), while others found trivial or no differences (2, 6, 7, 11, 12, 19, 21). Considerable variation with respect to type of experiment presented, the potential subject group, kind of incentive, type of appeal, measures employed to assess differences, and the definition of volunteering make the results of these studies inconclusive. In view of the extensive use of undergraduate volunteer subjects in psychological research, considerably more information is needed concerning the representativeness of these volunteers.

The purpose of the present study was to compare actual volunteers, pseudovolunteers, and nonvolunteers for four types of experiments on a series of motivational-personality and biographical variables.

B. METHOD

During the second and third class sessions of the semester, 631 introductory psychology students were administered the Personal Preference Schedule (4), the Sensation Seeking Scale (22), and a biographical information form covering birth order, family income, and father's education. At the next class session, the instructor explained that during the semester, the students would be given opportunities to volunteer as subjects for experiments and that one

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point would be added to each student's total in the course for each hour of participation. Two sessions later, before any student had an opportunity to volunteer for an experiment, the instructor handed each student a card containing a short description of an experiment and the time and place of the experimental session. The students were told that if they wanted to volunteer for the experiment described on the card, they were to tear off a reminder section and sign the other part of the card. Then each student was required to sign the back of his card "in order to take attendance for the day."

The cards were alike except for the short description of the experiment. One of the following descriptions appeared on each card. (*a*) An experiment to study the interaction of individuals in small groups. (*b*) An experiment to study adaptation to various levels of shock. (*c*) An experiment to study responses to a projective personality test. (*d*) A psychological experiment. About one-fourth of the students received each description. Since only one description appeared on a card, the student had no choice among experiments, but chose to volunteer or not for a single experiment. A special section on the card allowed the student to indicate that he wanted to volunteer but had a conflict with the time of the experiment.

The experimental sessions were held about two weeks later. The volunteers appearing for the sessions were run in one of four pseudo-experiments, depending upon the type of experiment for which the student had volunteered.

Three groups were identified for each type of experiment: nonvolunteers (NV), pseudo-volunteers who did not appear for the experimental session (PV), and volunteers who actually appeared for the experimental session (AV). Incomplete data cases ($n = 84$) and students who could not volunteer because of a time conflict ($n = 29$) were dropped from the study.

C. RESULTS

The percentage of students in the AV, PV, and NV groups for each type of experiment were: small group ($n = 127$)—59, 19, 22; shock ($n = 128$)—56, 25, 19; projective test ($n = 147$)—61, 26, 13; and psychological experiment ($n = 116$)—59, 35, 6. Because of the small number of students in the psychological experiment NV group ($n = 7$), the data for that experiment were not analyzed.

Within each of the remaining three types of experiments, a one-way analysis of variance was run across the AV, PV, and NV groups for each PPS scale, the SSS, family income, and father's education. In all, comparisons of the AV, PV, and NV groups within the three types of experiments yielded two significant ($p < .05$) *F*s out of the 54 computed. The number of significant *F*s is no more than would be expected on a chance basis.

A chi-square was run within each type of experiment on a birth order (only child, oldest, intermediate, youngest) by volunteering group (AV, PV, NV) frequency table. None of the chi-square values were significant at $p < .05$.

D. DISCUSSION

The motivational-personality scales and biographical variables covered in this study provided no basis for differentiating among the three volunteering groups. This was true regardless of the type of experiment for which the students supposedly were to be the subjects. These data suggest that in the common situation in which subjects are drawn from introductory class students and some explicit class-related incentive is provided for participation (course points, compulsory experimental hours), subject volunteer bias is of minimal importance. The two other studies reviewed that clearly met both of these conditions (2, 19) also found negative results. However, variations along other relevant parameters in these studies and the present one prohibit any definite conclusions.

E. SUMMARY

Three introductory psychology student volunteering groups for each of three types of experiments were compared on a series of motivational-personality and biographical variables. Results indicated that volunteers who appeared for the experimental sessions, volunteers who did not appear for the experimental sessions, and nonvolunteers did not differ significantly on these variables.

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THE DEVELOPMENT OF POLITICAL ATTITUDES IN YOUNG CHILDREN*

Department of Psychology, Boston University

FREDA REBELSKY, CHERYL CONOVER, AND PATRICIA CHAFETZ[1]

A. INTRODUCTION

In recent years there has been a growing interest in the development of political attitudes. Studies of this topic come from a variety of disciplines though their main focus has been political attitudes of adolescents and young adults (7, 8, 9). Despite this emphasis on the development of political attitudes in adolescents, a series of studies by Hess and Easton (3, 4, 5) indicate that most political knowledge and attitudes have been acquired before adolescence. In a more recent study of 12,000 elementary school children, Hess and Torney (6, p. 23) found that "the acquisition of political attitudes proceeds rapidly, especially through fifth grade."

The present study was designed to investigate children's knowledge of and attitudes towards issues relevant to the 1968 presidential election. Because of our interest in some of the cognitive components of children's development of political perceptions, our sample included preschoolers.

B. METHOD

1. *Subjects*

Subjects were 292 children from age two to age 13; half of each sex. Eighty percent of the children were white; the rest were of a variety of racial extractions.

2. *Procedure*

Children were interviewed with an open-ended questionnaire which permitted the child to explain his answers. Questions pertained to the President—his duties and possible successors—and issues of the 1968 Presidential election. Three of the items were scored for accuracy of information, three items were treated as attitude items, and responses to the remaining items were treated as qualitative data. The qualitative data were analyzed with the use

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[1] We thank Victoria Hilkovitch for her help in preliminary data analysis.

of a frequency distribution of all responses given for each item, for each group of children.

Subjects were divided by age, sex, and race. Children up to age five comprised the young group; children from six to nine composed the middle group; the remaining children constituted the old group.

C. RESULTS

1. *Age Trends*

As expected, the proportion of accurate answers on information items increased with age. For all three items, the largest difference was between the youngest and the middle group; scores for the middle group more closely resemble those for the older group. As can be seen in Table 1, more children knew that there was a war than knew the name of the president or presidential candidates for all age groups. Moreover, more of the middle and older children knew the name of at least one presidential candidate than knew the name of the President.

TABLE 1
PERCENTAGE OF CHILDREN WITH ACCURATE RESPONSES

Questions	Young N = 45	Middle N = 134	Old N = 113
1. Who is President of the United States?	7%	55%	63%
2. Who wants to be the next President?	3%	62%	80%
3. Is there war any place now?	47%	80%	96%

The tendency to give response of "I don't know" rather than to respond inaccurately also increased with age. *E*s interpreted this to mean that the older children were more aware that they did not know the answer to a question.

The three attitude-opinion items were: "Would you like to be a president someday?"; "Is war good or bad?"; and "Is peace good or bad?"

As Table 2 shows, the responses of the middle children more closely resemble the responses of the older children.

TABLE 2
PERCENTAGE OF CHILDREN WITH INDICATED RESPONSES

Responses	Young N = 45	Middle N = 134	Old N = 113
1. I would not like to be President someday.	38%	58%	76%
2. War is bad.	71%	88%	85%
3. Peace is good.	50%	95%	97%

The data in response to the questions, "What does the President do?"; "Why do you or don't you want to be President?"; and "What's good/bad about war/peace?", reveal a large amount of overlap between the responses of the middle and the older children, but almost no overlap again between the responses of the younger and the middle groups. This similarity of the middle and the older groups is also true in terms of the distribution of response within each group. For example, the 247 middle and older children gave only nine different responses when asked "What does the President do?". In response to this same question, the 45 younger children gave 32 different responses.

2. *Sex Differences*

Since the age and race distributions were approximately equal for both sexes, it was possible to analyze sex differences without regard for age or racial biases. Approximately equal proportions of boys and girls knew at least one Presidential candidate and that there was a war somewhere. However, only 34 percent of the boys accurately knew the President's name, whereas 68 percent of the girls knew his name. There was almost no difference between the attitudes of boys and girls: approximately equal proportions of each sex wanted to be President, felt that war was bad, and responded that peace was good. Boys and girls also tended to have a similar frequency of responses to those items that elicited qualitative data. However, girls were more likely than boys to respond that the President's job was to "take care of us." Despite this rather nurturant view of the Presidency, girls were also more likely to use their sex as an explanation for not wanting to be President.

3. *Racial Differences*

A racial comparison on the proportion of accurate responses to information items indicates a high rate of variation by items. A slightly higher percentage of nonwhites knew the name of the President; a slightly higher percentage of whites knew that there was a war; and 61 percent of the whites as compared to 31 percent of the nonwhites knew the name of at least one Presidential candidate. Whites responded "I don't know" more frequently than they responded inaccurately, while nonwhites responded inaccurately more frequently than they responded "I don't know."

A slightly higher proportion of nonwhites than whites responded that they would like to be President and that war was good. A somewhat higher proportion of nonwhites responded "I don't know" when asked if peace were bad or good. The qualitative responses of both groups were similar. Race was not mentioned as a reason for not wanting to be President.

D. DISCUSSION

Our results suggest that there are consistent age-related learning patterns with regard to political information. Our data reveal a large difference between the responses of the younger group (two- through five-year-olds) and the older children in terms of both information and distribution of responses. There is much less difference between the middle and older children with respect to information, and almost no difference between these two groups with respect to the frequency distribution of responses. Thus, the data might be interpreted to suggest that there is a qualitative difference between the approach of the younger children and the other children which underlies and may explain the difference of information between them. This interpretation is supported by an examination of the content of the responses given by the younger as compared to the other children. For example, when the older children were asked what the President does, they most frequently responded that he makes laws, passes bills, and makes war. Responses of the younger children were more concrete and idiosyncratic: the President has birthdays, looks like Daddy, talks funny, rides horses, etc. This same concreteness is true for the items that are less related to information. For example, in response to the question "Why would you like to be President?" younger children answered things like to be tall, to have toys, to play drums, to "war my sister," and to run faster. These responses seem to indicate that the younger children were too egocentric and bound by the immediate to respond in an impersonal fashion. The nature of these responses would seem to support what Hess and Torney (6) have labelled the cognitive developmental model of political socialization. That is, children under six do not seem to have the cognitive maturity necessary to accumulate political information. On the other hand, the deceleration of political learning indicated by the similarity of responses of the middle and older children suggest that the accumulation model of political socialization (6) might apply to older children. This deceleration of political learning also supports Hess and Torney's conclusion that political knowledge increases rapidly in the early school years.

Our results are strikingly different than those found by Hess and Torney with respect to the President. The children in their sample knew more about the President than any other aspect of the political scene, whereas more of our children knew that there was a war and knew the name of at least one Presidential candidate than knew the name of the President. While 95 percent of their second graders knew the name of the President, only 55 percent of our middle group and 63 percent of our older group knew the name of the President. This difference of results is probably a reflection of the political developments between 1960 when Hess and Torney collected their data and 1968 when we collected our data. Their data were collected after the 1960 Presidential election which would tend to make the name of the new President more salient. Our data were collected just before the 1968 election in which the incumbent was not running. Thus, it is more likely that the children in our sample heard more comments regarding other candidates and the crucial issue of the war than they heard regarding the current President. While it is not surprising that young children are aware of the more controversial issues of the day, it does tend to disconfirm Hess and Torney's conclusion (6, p. 35) that "a young child's image of the national government is confined mainly to the President."

The children in our sample also reflect the political climate of their time on other issues. For example, of the middle and older children who wanted to be President, when asked why, over one third responded that they wanted to stop the war. Nearly one half of the middle children who did not want to be President said it was because they didn't want to get shot. Needless to say, both the war and the assassination of political figures were topics of discussion in autumn, 1968. Thus, our results seem to suggest that children's introduction to the political system is through the more salient topics of the day rather than through the person of the President.

These results are reminiscent of Converse's 1956 (2) re-evaluation of Centers' 1945 (1) study of American class structure and political attitudes. That is, it is difficult to generalize about political behavior from any one study, or even a group of studies, that are conducted in any one political era. With the change in political climate often comes a change in results of studies related to political behavior. This is especially important for the study of the development of political knowledge and attitudes, since it suggests great limitations to the interpretation of results of longitudinal studies in this area.

E. SUMMARY

This study was an investigation of the acquisition of political knowledge and attitudes by children of ages two through 13. Two hundred and ninety-two children were interviewed on topics pertaining to politics. It was found that information increased with age, but that children under six responded in a very different way than did the older children. Results also showed that children knew more about the controversial issues of the day, such as the war, than knew the name of the President. This result seemingly contradicts Hess and Torney's (6) contention that the child initially relates to the political system

through the person of the President. To reconcile this discrepancy of data, the authors suggest that children first learn whatever is politically important at the time. The person of the President was important at the time that Hess and Torney collected their data; the war was a larger issue at the time of our data collection. The authors conclude by pointing to the danger of generalization from political studies conducted during one political period.

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FOVEAL CRITICAL FLICKER FREQUENCY AS INFLUENCED BY INTERMITTENT STIMULATION OF THE OPPOSITE EYE AT VARIOUS LOCATIONS*[1]

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A. INTRODUCTION

Since the early work of such men as McDougall (19), Sherrington (23), and Abney and Watson (1), on the problem, investigators have been concerned with the possibility that the central convergence of the pathways from the two retinae may exert some influence on binocular perception.

Various stimulus arrangements have been used. These have included the direct comparison of binocular and monocular viewing of targets, generally to observe resulting brightness. The arrangements have also involved the stimulation of the second eye independently of the first to observe effects produced on the first eye. This category included not only steady but intermittent stimulation. With steady stimulation, the variables of luminosity and wavelength were most common. With intermittent stimulation it was generally manipulation of phase relations between the inputs to the two retinae. In some cases, stimulation was varied both in amount and retinal location. A complete review of the work would be far too extensive to include here.

The original issue—namely, whether the pathways from the two eyes do converge in such ways as to bring about functional integration in visual perception—resulted in two definite schools of thought. The conclusions of Sherrington against binocular summation and other convergent effects in perception were on the one side; Aubert (3) and McDougall, among others, were on the opposite. The early experiments themselves differed quite widely, and thus diverse kinds of evidence were used by the two opposite schools of thought. Sherrington chose intermittent stimulation of the two eyes in various combinations to test binocular perceptual integration.

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The experiments of the other men did not deal with CFF but with such features as binocular *versus* monocular brightness effects. Quite some time elapsed between the well-known Sherrington studies and a new interest in the matter. Various studies did bear on the matter in the meantime. Lohmann (18) found CFF elevated when the contralateral eye was stimulated simultaneously. Allen (2) found that wavelength distributions in contralateral adapting stimuli altered CFF in test targets. Depression from adaptation was greatest when the two targets were of the same wavelength. When wavelengths were complementary, some rise in CFF was produced. DeSilva and Bartley (10), focusing on Sherrington's work, showed that for a monocular target to appear as bright as a binocular one, it must be 1.27 to 1.44 times as luminous. Fry and Bartley (12) studied binocular effects by using the conditions for producing the old phenomenon, known as Fechner's paradox. Their results provided further evidence for binocular perceptual integration. Vernon (28) elevated CFF by stimulating the second eye, and lowered it by using the second eye for an adapting stimulus. Lipkin (16, 17), more recently, also lowered CFF by using an adapting stimulus on the second eye. Nevertheless, Sherrington's work on flicker, already mentioned, stood until several men replicated his study with improved techniques and greater exactness.

Ireland (15) tested twenty-four subjects under four conditions of stimulation: (*a*) monocular flicker, dominant eye; (*b*) monocular flicker, nondominant eye; (*c*) binocular flicker, out-of-phase; and (*d*) binocular flicker, in-phase. The results clearly indicated the CFF for binocular in-phase stimulation was reliably higher than the monocular. In view of the differences between monocular and binocular stimulation, Ireland postulated some interaction between the two eyes which appeared possible only by way of central mechanisms.

Thomas (25) was interested in determining the effect of interocular differences in intensity on CFF values reported with binocular regard, measured by both in- and out-of-phase pulses in the two eyes applied centrally and 10 degrees from the fovea. The results indicated a general subtractive effect of a less intense stimulus in one eye on the CFF of a more intense stimulus on the corresponding area of the other eye. He found the subtractive effect to be even greater when both photic sources were placed 10 degrees peripherally from the fovea.

Thomas (26) compared CFF measured under three conditions: uniocular regard; binocular regard, pulses in-phase; and binocular regard, pulses out-of-phase. He postulated that if the impulses arriving from each eye were additive, then the synchronous stimulation should yield a visual effect identical to doubling the luminance of a stimulus projected on a given region of one retina. His results showed that over the range of luminance studied, binocular CFF with synchronous pulses was significantly higher than the binocular CFF with out-of-phase pulses or the uniocular CFF. The difference was only about one-half to one-third as much as from doubling the luminance of a target viewed with one eye. The magnitude of summation was independent of pulse luminance and pulse frequency.

Baker (4) described six experiments concerned with monocular and binocular CFF. The consensus of the six studies briefly described by Baker was that the resultant binocular percept is different from that arising from stimulation of either eye alone and that binocular fusion occurs and involves central processes. Baker (5), in one of two experiments, used "progressive" and "instantaneous" stimulus occlusion. In the first of the two experiments, he demonstrated that higher CFF values could be obtained using an "instantaneous," rather than a "progressive" target. In the second experiment, he used an "instantaneously" occluded source of stimulation for one eye and a "progressively" occluded source for the other. He supposed that the CFF value obtained under this condition should fall somewhere between that value obtained with "instantaneous" or "progressive" occlusion alone. He interpreted his results as confirming the supposition that central factors are involved in binocularly fusing neural impulses set up by stimulation of the two foveas.

Perrin (21) found that for a two-degree visual field and dark surround, as the field luminance was varied, the increase in binocular in-phase CFF was proportional to the mean critical frequency for the two eyes. Perrin was also concerned with the effect of field size on binocular summation. As would be expected, he found that increasing the stimulated area—at constant luminance—increased the critical frequency. He also noted that as the area of the target increased from zero to 12 degrees, binocular summation increased; the amount for corresponding areas was about eight percent, while for noncorresponding areas it was about .4 percent (21). Crozier and Wolf (9) reported binocular CFF higher with simultaneous stimulation of the eyes in-phase. Simonson (24) found that the effect of an adapting stimulus in the second eye affected CFF maximally throughout a range of 325-380 mL.

A study by Wolf and Zigler (29) determined monocular and binocular thresholds for various points along the peripheral retina with steady stimulation. Their measures extended from 30 degrees to the left to 30 degrees to the right of fixation on a horizontal meridian and on a parallel line 1.5 degrees below the meridian. They found that in the binocular curves the thresholds were high at the center, dropped to low levels between 5 and 20 degrees, and gradually rose farther in the periphery. Thresholds were maximal at approximately 17.5 degrees. The monocular curves were asymmetrical due to the blind spots in the left and right fields. They also found that the binocular thresholds were slightly lower than the monocular thresholds, indicating slight binocular summation.

In more recent years, the study of visual phenomena (even perception) has shifted and now includes neurophysiological studies whereby various problems can be given quite specific formulations and receive, at times, quite definite answers. Among the kinds of studies alluded to here are those of Hubel and Wiesel (14) in which they found that four-fifths of the cortical cells they tested in cats were influenced independently by the two retinae. For the others, summation was demonstrated when corresponding parts of the two retinae were stimulated similarly. There was considerable difference among these cells. They varied from those being about equally influenced by both eyes, to those in which either the ipsilateral or the contralateral eye was most influential.

DeValois (11) failed to find evidence for mixing of signals prior to the geniculate nucleus. Since anatomical evidence shows considerable complexity within the nucleus itself and with reference to the loci of elements feeding into it, the simplicity of functional results in testing retinal receptive fields at the genicular level leaves considerable to be yet discovered. This is to say, it is not clear why the anatomy is as complex as it is, and the neurophysiological records are as simple as they are.

Since most of the psychophysical studies cited were concerned only with foveal stimulation, we proposed to investigate the effect upon foveal vision via one eye, from stimulating points progressively farther and farther from the fovea on the other eye.

The use of intermittent stimulation ought to serve two main purposes: gain information on binocular interaction as a general consideration, and add to our knowledge regarding the interaction of channels in the optic pathway as conceived in the work on the Alternation of Response Theory, an important focus of study for many years.

B. METHOD AND PROCEDURE

1. *Subjects*

Three students (1 male and 2 females), including the principal author, served as subjects. All subjects had considerable experience in making flicker discriminations.

2. *Apparatus*

The apparatus consisted of a metal rod curved into a horizontal half circle (arc) with a radius of 16 inches; a septum which divided the left and right visual fields; and a chin rest placed so that the entrance pupil of the right eye was exactly at the center of the arc.

Two vertical rods clamped to the arc held the targets. Each target was a circular ½-inch luminous area of opal glass subtending a visual angle of 1°47′ at 16 inches at the eye, in the face of a lamphouse. The two targets were equated in luminosity by means of a Macbeth photometer. Their luminance was 1.53 candles/ft^2, a constant throughout the study. A small red "seed" lamp, positioned in the center of the left stimulus target, served as a fixation point.

The target for the left eye remained stationary throughout the investigation, while the target for the right eye was moved along the rod (arc) in 10-degree steps.

The target lamps were two Sylvania R1131C glow-modulator tubes activated by square-wave timers (two Grass Model S-4 variable-frequency square-wave stimulators). Both glow-modulator tubes were completely silent at all times. Adjustment of the frequency of both stimulators was always made by the experimenter and monitored by a Beckman digital counter.

A series of Hunter Model 100-C decade relay timers activated both glow-modulator tubes simultaneously for three seconds and provided a seven-second interval between activations. The timers also controlled a buzzer which was activated one second prior to the activation of the two glow-modulators to signal the subject for fixation on the red "seed" lamp in preparation for the coming stimulus presentation.

3. *Procedure*

Although each of the observers was experienced in making flicker discriminations, they practiced in the present study to establish their criteria for CFF. These trials are not included in the data.

At the beginning of each day's session, the observers were dark-adapted for one-half hour. The red "seed" lamp was fixated by both eyes. Following the warning signal, the target lamps were activated for three seconds. When the stimuli were extinguished, the observers reported whether the intermittent target was seen as steady or flickering.

The method of serial exploration, with five ascending and five descending trials, was used for each of the various rates of intermittency for each target condition according to a random order. The following conditions were used:

(*a*) fovea-left eye only; (*b*) fovea-left eye, fovea-right eye; (*c*) fovea-left eye, 10 degrees-right eye; (*d*) fovea-left eye, 20 degrees-right eye; (*e*) fovea-left eye, 30 degrees-right eye; (*f*) fovea-left eye, 40 degrees-right eye; (*g*) fovea-left eye, 50 degrees-right eye; (*h*) fovea-left eye, 60 degrees-right eye; and (*i*) fovea-left eye, 70 degrees-right eye.

Each experimental session, including the adaptation period, lasted about two hours. A total of five sessions on consecutive days was involved for each observer.

C. RESULTS

The flicker curves plotted in cycles per second are shown in Figure 1A. Open squares represent Subject 1; solid squares, Subject 2; open circles, Subject 3. Each point is the mean of 50 CFF determinations. The curve with solid circles represents averaged results for the three subjects. Each point is for 150 CFF determinations. The CFF measured with foveal stimulation of both eyes is consistently a little higher than for either peripheral stimulation

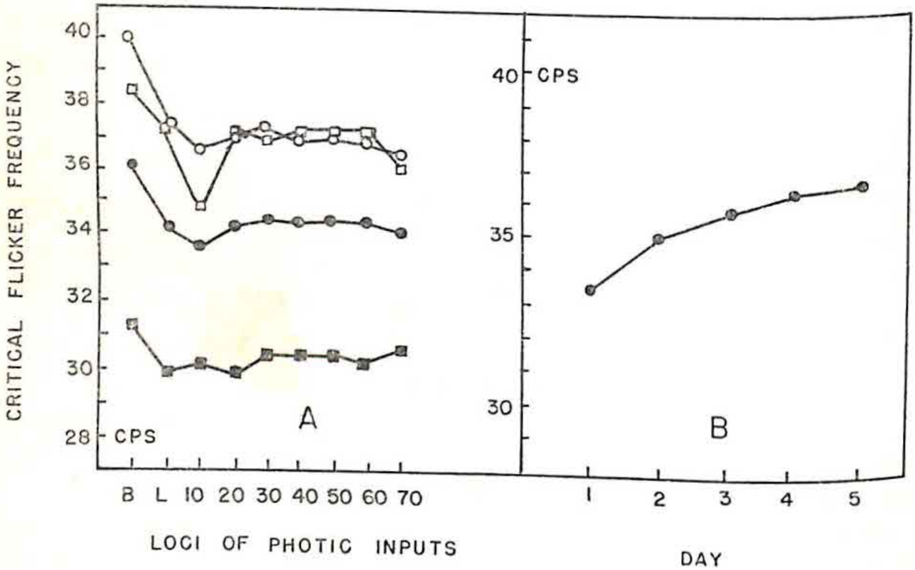

FIGURE 1
CRITICAL FLICKER FREQUENCIES FOR INDIVIDUAL OBSERVERS AS A FUNCTION OF LOCI OF STIMULATION AND CFF'S AVERAGED FOR ALL SUBJECTS FOR SUCCESSIVE DAYS OF OBSERVATION

Figure 1A (left) represents critical flicker frequencies for individual observers as a function of loci of stimulation. Open squares are for Subject 1; filled squares are for Subject 2; open circles are for Subject 3. Filled circles represent the average responses of the three observers. B represents foveas of both eyes stimulated; L is for left fovea; and the successive numbers are for degrees from fovea in right eye stimulated along with left fovea. Figure 1B (right) represents CFF's averaged for all subjects for successive days of observation.

of the right eye or stimulation of the left fovea only. A general drop in the curves for all observers appeared when the right eye was stimulated between 10 degrees and 20 degrees toward the periphery. Beyond 20 degrees, CFF remains fairly constant at approximately the level for the left eye alone. For two observers, CFF dropped beyond 60 degrees; while for the third, it rose.

A five-way analysis of variance showed that all of the main effects except "trials" were significant at the .01 level. One three-way interaction, days × trials × presentations, was significant at the .05 level. A test of individual comparisons was not made due to the small number of subjects.

Figure 1B shows the "learning" or "practice" effect over days. Each point is the mean of 270 CFF determinations. The curve becomes asymptotic at about day four. The significant "days" main effect was attributed to the rise in CFF thresholds over days. This shift in the CFF curve agrees with data presented by Ireland (15).

Figure 2 shows CFF curves for Observers 1, 2, and 3, respectively. Open circles represent an average of the CFF's for the first two days of the experiment, solid circles, for the last two days. Although the CFF's for the last two days are typically higher, the overall shapes of the two curves are similar

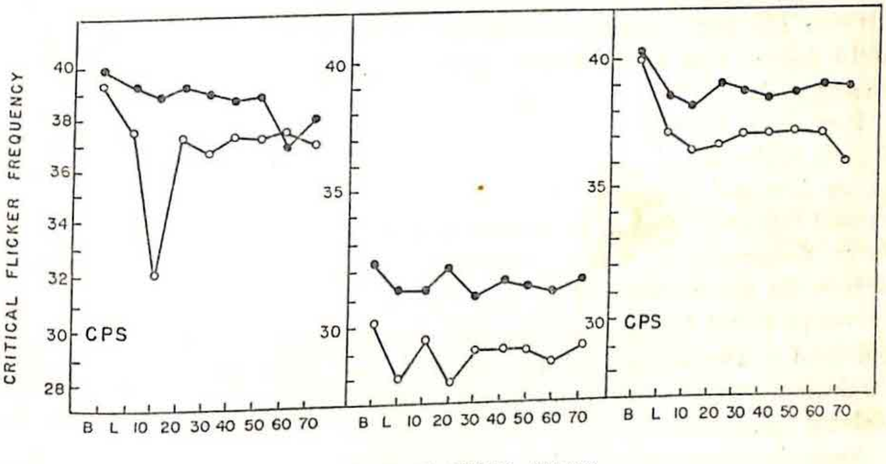

FIGURE 2

AVERAGED CFF's OF DAYS 1 AND 2 AND THE AVERAGED DAYS 4 AND 5 FOR OBSERVERS 1, 2, AND 3

Curves showing the averaged CFF's of days 1 and 2 (open circles), and the averaged days 4 and 5 (filled circles) for Observers 1, 2, and 3, respectively. B is for foveas of both eyes; L is for fovea, left eye only; 10, 20, 30, etc., represent degrees from fovea in right eye, stimulated along with left fovea. Critical flicker frequency is given in cycles per second.

enough to indicate that differences which appeared have more to do with level of sensitivity than with other changes of function.

D. Discussion

That synchronous stimulation of the foveas of both eyes yields a significantly elevated CFF agrees with the results obtained by several authors (4, 5, 6, 15, 26, 27). These and the results of the present study indicate some amount of binocular summation.

Thomas (26) reported average differences of 1.37 and .89 pulses per second between binocular and uniocular CFF's. In the present study, the value obtained for the same comparison—1.78 pulses per second—closely resembles those reported by Thomas.

The drop in the curves at 10 degrees for two of the observers at first appears to coincide with the effect reported by Thomas (25), but in comparing the results from the two studies, certain procedural differences must be kept in mind. Thomas was concerned with CFF as a function of stimulus intensity, and the depressive effect he reported was due to differences in intensity of the stimulus targets. Also in the Thomas study, both targets were displaced 10 degrees, whereas in the present study, only the right target was displaced and the CFF determinations were always made for the fovea of the left eye. The fact, however, that Thomas did find a greater depressive effect at 10 degrees than at the fovea appears to coincide with the results of the present study.

Ross (22) determined CFF's at the fovea and at five, 10, 20, 30, and 45 degrees in the retinal periphery using a single target, in which case frequency values decreased as the target was moved toward the periphery. His curves showed that at 45 degrees the CFF's were about 50 percent as large as at the fovea, the greatest drop occurring between zero and 10 degrees. Beyond 10 degrees the curve continued to drop but more gradually. In contrast to the curves presented for binocular thresholds in the present study, Ross's curves indicated no increase in CFF beyond 10 degrees. Our CFF increases beyond 10 degrees suggest some degree of binocular summation occurring during peripheral stimulation.

Since the proportion of rods to cones increases toward the periphery of the eye, the points of stimulation beyond 10 degrees may be viewed as stimulation to two different populations of receptors. Thus, although the stimulus inputs to the two populations of receptors were synchronous in the present study, it is unlikely that their inputs to the central nervous system would be synchronous. Bartley (7), working with single photic pulses, found that when the area of the target was within a certain range, the subject reported seeing two flashes. He deduced from this that the two flashes were obtained when both the rod and the cone populations are activated, and when the one population reacts more quickly than the other population. Bartley and Wilkinson (8) confirmed the earlier findings. Gouras (13) presented electroretinogram records showing rod and cone threshold response latencies in the dark adapted retina of the Rhesus monkey. The records indicated a considerable (100 msec) time delay between the cone and rod responses with the cone response being the faster. Therefore, if there is a difference in the latencies of the rods and cones, as there well appears to be, then the points beyond 10 degrees on the curve in Figure 1A may actually represent CFF determinations under cortical out-of-phase stimulation rather than under synchronous stimulation as was originally assumed. Such an interpretation would seem plausible in light of the following data. Perrin (21) found that with a two-degree field, subjects' monocular CFF values were approximately midway between the binocular thresholds with alternate flashes and those with synchronous flashes. Thomas (25) also reported that binocular CFF with out-of-phase pulses tended to be the same as the uniocular, or in some cases lower.

The results of the present study add to the evidence that the timing of stimulus inputs, and thus the receptor outputs, has a considerable influence on processes within the visual system. The results add to the evidence that interaction (thus, summation and/or inhibition) occurs between the channels in the two eyes even when the two sets pertain to widely disparate portions of the two retinae, and possibly when rod and cone populations—owing to different latencies—do not respond together.

E. Summary

The method of serial exploration was used to determine CFF for three subjects. With stimulation being supplied synchronously, the subjects made CFF determinations at the fovea of the left eye under the following nine conditions: fovea-left eye; fovea-left eye, fovea-right eye; fovea-left eye, 10 degrees-right eye; fovea-left eye, 20 degrees-right eye; fovea-left eye, 30 degrees-right eye; fovea-left eye, 40 degrees-right eye; fovea-left eye, 50 degrees-right eye; fovea-left eye, 60 degrees-right eye; and fovea-left eye, 70 degrees-right eye.

The findings added evidence useful in defining the nature of binocular summation and inhibition and were in accord with previous studies.

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PERCEPTION OF LINEAR EXPRESSIONS BY INSTITUTIONALIZED MENTAL RETARDATES*

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A. INTRODUCTION

Werner and Kaplan's (4) studies have shown that individually reproduced nonconventional linear patterns can result in considerable degrees of consensuality as to their symbolic referents, even though inherently labile. Our study was performed in an attempt to determine whether the consensuality as found among normal adults is capable of being replicated by other groups, such as the institutionalized mentally retarded.

Goldman (1) found that schizophrenics lack consensuality and they used distinctively linear features in only 29 percent of their work, while 43 percent of their work was pictorial-realistic in character. The schizophrenics appeared to lack, relatively, a differentiation of self-object relationships; the embedded quality of their personalized-idiosyncratic reactions (which dominate their vital field or *Umwelt*) hinders consensuality. The conditions for consensuality were (*a*) similarity of features of linear vehicle as created by a group of subjects for a given referent, and (*b*) consensus by a group of subjects to apprehend the referent as created by someone else. Goldman's experiment matched "positive" referents to light, round, and upward-directed linear stimuli, and "negative" words to dark, angular, and downward-directed line patterns. His findings are supported by Lundholm (3), whose results strongly indicated that "sadness" was equated with downward-curved linear representations, "gaiety" with upward-curved and horizontal linear vehicles, and "hardness" with angular-horizontal linear patterns.

Krauss (2) was able to find comparable similarities, such as "rage" being reproduced by angular patterns. Thus, it becomes clear that linear products give way to physiognomic characteristics, such as angularity being equated with unpleasantness, hardness, vigor, strength, moodiness, and ugliness, and that curvilinearity evokes weakness, gentleness, serenity, and/or smoothness.

These experiments thus suggest that a primordial sharing of linear patterns is possible with most groups, save with the possible exception of schizophrenics. Therefore, the organismic-developmental viewpoint notes a shift from egocentrism to socialization, or increasing differentiation (distancing) between self and the world of objects. Geometric forms become imbued with expressive or physiognomic dynamic qualities which are consensually valid, even when employed plurisignificantly as representational vehicles.

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B. Procedure

The *S*s in this study consisted of 60 institutionalized mildly mentally retarded (*IQ*s 50-69) adolescents and adults, male and female, who were divided into four approximately equivalent groups. These four groups consisted of: (*a*) 15 male adults ($\overline{X}$ CA = 31.1); (*b*) 15 female adults ($\overline{X}$ CA = 29.1); (*c*) 15 male adolescents ($\overline{X}$ CA = 15.2); and (*d*) 15 female adolescents ($\overline{X}$ CA = 16.0). The mean ranges of *IQ*s for all four groups was from 61.7 to 62.

The testing materials consisted of 3 × 5 white unlined index cards, on which various linear graphics were drawn, representing various types of symbolic lines, specifically, upward *versus* downward, long *versus* short, and curved *versus* angular. Secondly, an expressive name was stated to which each subject was asked to draw one line which he felt correctly reflected its meaning. Only three expressive words were used, and these were "happy," "weak," and "strong." The order of the cards presented to the *S*s and their expressive words were as follows: Mad (5 cards), happy, sad (4 cards), weak, hate (5 cards), running, stopped (2 cards), strong, and red (4 cards). Only those *S*s who were able to complete the whole series were acceptable for data computation purposes.

C. Results and Discussion

In order to confirm or deny the existence of substantive degrees of consensuality between conventional linear patterns and emotionally-charged symbolic referents, the frequencies of subject pairings were ascertained, and then converted to percentages. Table 1 presents the degree of association between emotive adjectives and various aspects of each linear symbol. A perusal of Table 1 indicates that an angular pattern is predominantly depicted as representing the adjectives "strong" (87 percent of the *S*s) and "hate" (85 percent of the *S*s). "Weak" and "mad" follow, in order of decreasing degree of consensus. But "weak" as applied to angulation seems to contradict the consensus of "strong."

In our opinion, this seeming paradox can be explained and reconciled by reference to Krauss' finding that one line pattern may represent diverse referents depending upon variations in the physiognomic character of the linear form. In the present case, other aspects of the linear pattern, light and heavy, seem to intrude. Since they, respectively, receive consensus as "weak" (72 percent) and "strong" (93 percent), it seems natural that the weight of the drawn line would govern the affect description of an angular line. Therefore, a heavy-angular line may be strong while a light-angular line may be weak, making multiple factors of this type responsible for the plurisignificance of a concept which might otherwise receive insignificant consideration.

TABLE 1
CONSENSUS CHART RELATING LINEAR PATTERN VARIABLES TO AFFECTIVE-DYNAMIC REFERENTS

Linear pattern	Word referents (Percent of Subjects)
Angular	Strong (87%); Hate (85%); Weak (67%); Mad (60%)
Circular	Nice (85%); Red (83%); Happy (57%)
Light	Weak (72%)
Heavy	Strong (93%)
Long	Run (90%)
Short	Weak (68%)
Down	Sad (62%)

Nevertheless, there can be little doubt that geometrical patterns can be transformed into highly differentiated, expressive terms. As found by Lundholm, curved-upward lines, represented in the present study by a circular-upward pattern, are usually described by the words, "gaiety" (Lundholm's term) or "happy" (57 percent). And, for predominantly curved-downward line patterns, the idea of "sad" (62 percent) confirms Lundholm's finding of sadness. His evidence also points to angular-horizontal patterns as representing hardness, which is allied to the findings of the current study by the denotation of angulation as "mad" (60 percent) and "hate" (85 percent), both variables carrying the connotation of harshness.

In like fashion, the findings of Krauss, with regard to angular-circular patterns, are confirmed to some extent. He found that angular lines bring forth the concept of rage while circularity produced a feeling of warmth or redness, a hot color. The present study also views angularity in rage-related terms, "mad" (60 percent) and "hate" (85 percent), which seem to express anger equivalent to rage, and sees circularity, with a high degree of consensus, as "nice," "red," and "happy."

In like comparison with Goldman's finding about normal subjects, there are more positive values assigned to light, round upward lines than to dark, angular, downward lines. The only exception apparently belongs within the variable continuum, strong to weak. Current findings suggest that light lines are "weak" (72 percent) and that heavy lines are "strong" (93 percent). Once again, the matter seems to lie in the context of the geometric pattern. Light is weak, and heavy is strong, when both are related to linear angulation or length. That is, the short, light, angular line is weaker than the long, dark, angular line. Thus, although consensus can be easily demonstrated for general linear types, with a high degree of reliability, certain nuances tend to produce a complex situation with multivariant meanings and relationships, which broadens with increased contextual variance.

The above results do indeed support the notion that most groups, including mental retardates, share relatively stable modes of expression in describing common symbolic patterns. A suggestion arises from this conclusion that primordial meanings exist, in the manner of an archetype, which operate universally. If such a theoretical principle operates, it would go a long way toward explaining why normal subjects transform geometric patterns into conventional symbols in order to establish natural relationships between vehicle and referent. That is, the roundness or the straightness of a pictorial form becomes abstracted, with only slight residual overtones from contextual matter, and becomes associated to recurrent meanings which developed phylogenetically.

However, as found by Goldman, the autonomous nature of the linear-affective meanings does not manifest itself for schizophrenics who are overinclusive in their cognitive organizations. That is, plurisignificance runs wild and knows virtually no bounds. The symbolic vehicle becomes associated with idiosyncratic contacts and personalized reactions which lose the conventional qualities adhered to by normals. This observation also supports the archetypal hypothesis in the opinion of the authors, because the psychotic cannot order his unconscious material at the conscious level (primary process) and cannot maintain the psychological distance necessary for differentiation, thereby eliminating consensus.

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A FIELD-INDEPENDENT ALCOHOLIC POPULATION*

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A. INTRODUCTION

Studies (1, 4, 5, 12) have shown the alcoholic population to be field dependent. It has been concluded from these studies that alcoholics have a characteristic cognitive style whether drinking or sober (5, 6). In a study comparing alcoholic populations from different sources, it was noted that the population from Alcoholics Anonymous was significantly more field independent (F.I.) than nonmembers (5). Reilly and Sugerman (8) compared two theories of cognitive style and found that while their alcoholic population was functioning on low levels of cognitive complexity, there was a significant differentiation within their population, in terms of ability to do the Embedded Figures Test (EFT), which was in agreement with the "systems" (2) of cognitive complexity.

The purpose of this study was to explore EFT performance of a higher socioeconomic level population of alcoholics who were being treated at Shadel Hospital. Wober (14) has suggested that increasing success in our particular society is correlated with an increase in differentiation. While cause and effect cannot be clarified, this alcoholic group with a higher annual income would be expected to be more F.I. if Wober's theory is valid.

B. METHOD

1. *Subjects*

A group of 21 chronic male alcoholics were tested at Shadel Hospital. A mean age group was 49.2 years of age, ranging from 38 to 60 years. Selection of patients was unsystematic but it was the opinion of the staff that no bias was introduced into the selective process and the population was representative of Shadel Hospital.

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2. *Tests*

The short form of the EFT (3) was administered to the subjects. The EFT is a test of perceptual field dependence as reported by Witkin *et al.* (11). The subject is presented with a simple geometric figure and asked to find it in a complex design. The subject's score is the time (in seconds) to complete this task in a series of 12 complex figures. The higher the score, the more field dependent (F.D.) the individual is.

C. RESULTS

The mean score on the EFT was 1024.6 seconds ($SD = 426.5$). The scores ranged in approximately a normal distribution from 463 seconds to 1855 seconds. EFT scores were not significantly correlated with the age of the individual and the product moment for the group data was: $r = +.302$ (NS).

D. DISCUSSION

The population tested by most researchers has been an available but unstable and unemployed group and it is possible that misleading theories of alcoholism have been generated by the systematic selection of this group. No conclusions as to which group is typical of "alcoholism" can be made from the data readily at hand. This study is merely an empirical one in which one established psychological measurement is administered to an alcoholic population.

The Shadel Hospital patient population has been discussed elsewhere (7). A 1967 sample of patients from this group had a mean age of 45 ($N = 44$) and an average annual income of $17,000. These data indicate that there are rather large socioeconomic differences in alcoholic populations between Shadel's patient population and those tested in state and city alcoholic clinics.

The results of Karp *et al.* (5) report that a "dry" A.A. group had a mean score of 1146.0 seconds on the short form EFT, a "wet" A.A. group scored 1535.1, a "dry" clinic group scored 1887.9, and a "wet" clinic group scored 1760.7. Unfortunately, there are no standard deviations reported in Karp *et al.* (5), so no significance statement can be made as to how much more field independent the Shadel group is in comparison. However, the scores reported by Reilly and Sugerman (8) can be used. Their population from alcoholic patient volunteers scored 1231 seconds ($SD = 513$, $N = 62$) for the group functioning at a "concrete" level and 957 ($SD = 452$, $N = 29$) for those functioning at a higher "concrete" level. The difference between Shadel's population and the former group is significant at the .05 level, if a one-tailed test is used ($t = 1.743$); the latter group, however, is not significantly different at this level ($t = .545$). It should be noted that the population reported by Reilly and Sugerman (8) is more field independent than that reported by Karp *et al.* (5).

The correlation between age and EFT performance in the Shadel population is not statistically significant ($r = +.302$, NS). Former studies (9, 11) have shown a correlation between these measures, and a lack of relationship in this population may reflect a sampling problem.

Normative data from the same age group should be used so that a statement can be made of how these patients differ from normals. A recent study (10) collected data on normals, hypertensives, and ulcer patients. The age of the normal group (mean = 46.6 years) is appropriate for this study, and it was found that this group was more field dependent (F.D.) than the Shadel alcoholic population (mean = 1126.8; $SD = 672.2$; $N = 30$). The normal group (age 30-39) from the Schwartz and Karp (9) study seemed to score high (1213.2 seconds per 12 figures, with a five-minute limit) and this group should do the EFT much more quickly than the alcoholic group because they are younger. Other studies (e.g., 4) have used norms based on young male normals (13). Such a norm is inappropriate because, as Karp *et al.* (4) have noted, this dimension of cognitive style is correlated with age.

The results of this study and the reported scores of the Reilly and Sugerman study (8) lead us to question whether all alcoholic populations are field dependent. It is clear that the scores of the Shadel population are more field independent (F.I.) than an appropriate normal control group. Furthermore, it is possible that educational level could be an influence on the ability to perform on the EFT.

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THE INSTRUCTIONAL EFFECT OF MOTION IN VARIED VISUAL ILLUSTRATIONS*

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A. INTRODUCTION

The use of motion to point out relevant cues in visualized presentations is a common instructional technique in many classrooms. It is usually used to focus student attention on the important aspects of the instruction. Implied in its use is that it in some way aids or promotes student achievement. However, at the present time there is very little experimental evidence indicating the effectiveness with which motion can be used as an instructional technique.

Previous research (1, 2, 3, 4) has pointed out that all types of visual illustrations are not equally effective in complementing oral instruction. One of the explanations usually given is that the additional stimuli contained in the more realistic visuals tend to distract student attention from relevant cues in the oral and visual instruction, thereby reducing their effectiveness as efficient learning media. Presumably if motion could, by channeling the students' attention to the relevant cues, improve the instructional effectiveness of the more realistic visuals, a significant contribution will have been achieved.

Thus, the purpose of this study was to determine which types of visual illustrations supplemented by motion were most effective in promoting student achievement on the five criterial measures.

B. METHOD

1. *Subjects*

One hundred and thirty-nine students in the Psychology 2 class at The Pennsylvania State University were used as *S*s.

2. *Treatment Groups*

Students in Group (Grp) I, the control group, received no visual illustrations of the heart but viewed printed words depicting the concepts being discussed; Grp II viewed simple line representations of the heart. Grp III

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viewed detailed, shaded drawings. Grp IV viewed photographs of a heart model, and Grp V viewed realistic heart photographs.

3. *Procedure*

Students were placed in treatment groups by indicating which of the five instructional sessions they would be able to attend. The experimental treatments were then assigned at random to the five groups. To achieve the objectives of the study, a 2000-word instructional unit on the heart was used. The five visualized sequences used had been developed for a previous study (2). Each sequence contained 39 B and W slides. Each slide was designed to illustrate a specific item of information described in the heart script. The oral instruction, which was audiotaped, was identical for all treatments. The audiotaped instruction contained audio signals which cued the change of slides so that the appropriate visuals appeared simultaneously with the oral instruction they were designed to complement. While the treatments were being videotaped, the investigator pointed out on each illustration the information being described orally via the tape recorder. Each group received their respective videotaped treatments in conventional television classrooms via 22-inch monitors.

4. *Criterial Measures*

Each student in each treatment received the Otis Quick Scoring Mental Ability Test as a pretest, participated in his respective instructional treatment, and then received four individual criterial tests. Scores achieved on these tests were combined into a 78-item total criterial test. The objective of each test was as follows: (*a*) drawing test—to evaluate learning of specific locations of the various patterns, structures, and positions of the parts of the heart; (*b*) identification test—to measure transfer of learning: i.e., the ability to identify numbered parts on a diagram of the heart from information received in the instruction; (*c*) terminology test—to evaluate knowledge of referents for specific symbols; (*d*) comprehension test—to measure understanding of the heart, its parts, and its internal operations; and (*e*) the total criterial test—to measure the student's total understanding of the concepts presented. The Kuder-Richardson Formula 21 reliability coefficients for the five criterial measures were: (*a*) drawing test, .82; (*b*) identification test, .79; (*c*) terminology test, .79; (*d*) comprehension test, .75; and (*e*) total criterial test, .93.

C. RESULTS

The Hartley test for homogeneity of variance (6, pp. 94-95) and an analysis of variance were conducted on the *IQ* scores students achieved on the Otis Quick Scoring Mental Ability Test. In no case did the observed values reach the critical value for a .05 level test. Thus, it appeared that the treatment groups were drawn randomly from populations with common variance.

An analysis of variance indicated that significant differences existed among the means of the five treatment groups on three of the five criterial tests: drawing test ($F = 3.47$, $df = 4/127$, $p < .01$); terminology test ($F = 3.84$, $df = 4/127$, $p < .01$); total criterial test ($F = 3.47$, $df = 4/127$, $p < .01$). Comparisons among the individual means of the five treatment groups, via Tukey's W-Procedure (5), were conducted to determine the effectiveness of the various treatments in improving student achievement on the criterial measures (see Table 1).

Analyses of the differences between treatment means indicated that (*a*) for learning objectives similar to those measured by the identification and comprehension tests, the oral presentation complemented by printed word symbols was as effective in promoting student achievement as were those presentations complemented by visual illustrations of the heart; and (*b*) on the drawing test (Grp II > Grp I, W = 3.13, n/v = 5/131, $p < .01$), terminology test (Grp II > Grp I, W = 2.82, n/v = 5/131, $p < .05$), and total criterial test (Grp II > Grp I, W = 10.34, n/v = 5/131, $p < .05$); (Grp V > Grp I, W = 9.00, n/v = 5/131, $p < .05$) the students viewing the abstract line presentation (Grp II) achieved significantly higher scores than did those students receiving the oral presentation (Grp I). On the total criterial test students receiving the realistic photographic presentation also achieved significantly higher scores than did students receiving the oral presentation.

D. DISCUSSION

The results indicate that students who viewed the visually complemented treatments achieved significantly higher scores on the drawing, terminology, and total criterial tests than did students who received the oral presentation without visuals of the heart. In terms of economy and instructional effectiveness the abstract line presentation was most effective in facilitating student achievement on the three criterial tests where significant differences were found to exist. The success of the line drawings complemented by motion may be attributed to the fact that students viewed their respective instruc-

TABLE 1
TUKEY'S W-PROCEDURE FOR DIFFERENCES BETWEEN PAIRS OF MEANS

Treatment	*N*	*SD*	Mean *IQ* score	*Mean*	W-Values			
					Grp II[a]	Grp III[b]	Grp IV[c]	Grp V[d]
				A. *Drawing test*				
Oral Pres. (Grp I)	25	2.8	121.60	10.80	3.12**	.96	.93	2.24
Abstract Line (Grp II)	29	3.5	120.55	13.93		2.17	2.20	.89
Shaded Drawing (Grp III)	25	4.6	122.16	11.76			.03	1.28
Heart Model Pres. (Grp IV)	26	3.0	122.27	11.73				1.31
Photographic Pres. (Grp V)	27	2.9	123.89	13.04				
				B. *Terminology test*				
Oral Pres. (Grp I)		3.3		12.28	2.82*	.20	.57	2.64
Abstract Line (Grp II)		3.6		15.10		2.62	2.25	.17
Shaded Drawing (Grp III)		4.6		12.48			.37	2.45
Heart Model Pres. (Grp IV)		3.2		12.85				2.08
Photographic Pres. (Grp V)		3.4		14.93				
				C. *Total criterial test*				
Oral Pres. (Grp I)		7.4		46.04	10.34*	3.40	4.11	9.00*
Abstract Line (Grp II)		11.9		56.38		6.94	6.23	1.34

TABLE 1 (*continued*)

Treatment	*N*	*SD*	Mean *IQ* score	*Mean*	W-Values Grp II[a]	Grp III[b]	Grp IV[c]	Grp V[d]
Shaded Drawing (Grp III)		17.4		49.44			.71	5.60
Heart Model Pres. (Grp IV)		10.1		50.15				4.89
Photographic Pres. (Grp V)		9.7		55.04				

* $p < .05$.
** $p < .01$.
[a] Mean Scores for Group II: Drawing Test, 13.93; Terminology Test, 15.10; Criterial Test, 56.38.
[b] Mean Scores for Group III: Drawing Test, 11.76; Terminology Test, 12.48; Criterial Test, 49.44.
[c] Mean Scores for Group IV: Drawing Test, 11.73; Terminology Test, 12.85; Criterial Test, 50.15.
[d] Mean Scores for Group V: Drawing Test, 13.04; Terminology Test, 14.93; Criterial Test, 55.04.

tional presentations for equal amounts of time. The line drawings presented succinctly the relevant information and the use of motion focused the students' attention on the important aspects of the instruction. If we can assume that the accuracy and the amount of information that can be perceived in a visual depends on the amount of time available for viewing, then the realistic drawings and photographs would be at a disadvantage. Even though the more realistic visuals contained more information than the line drawings, the students did not have sufficient time to take full advantage of the additional information presented by the realistic detail. Apparently the use of motion as an attention-gaining cue is not an effective instructional technique for improving student achievement when the presentation utilizes the more realistic visuals and the students are limited in the amount of time they can interact with the visual information.

Another possible explanation may also be suggested to account for the effectiveness of the line drawings. The additional stimuli contained in the more realistic visuals may have had the tendency to distract attention from information in the oral presentation or important visual cues pointed out in the illustrations, thereby impeding rather than facilitating student achievement.

E. SUMMARY

The results of this study indicate that when visuals are viewed for equal amounts of time (*a*) some types of visuals are more effective than others in improving student achievement of varied objectives, and (*b*) the use of motion in the more realistic visuals is not an effective instructional technique for increasing student achievement.

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EFFECTS OF ATTITUDE TOWARD SITUATION UPON ATTITUDE TOWARD OBJECT*[1]

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A. Theory

Despite their plethora, attempts both to measure attitudes and to relate attitudes to behavior have produced rather ambiguous results. Rokeach (4, 5) has postulated that social behavior is determined by the cognitive interaction of at least *two* attitudes, "attitude toward object" (AO) and "attitude toward situation" (AS), and that it has been the focus solely upon AO (which at least *seems* to be more general than AS) which accounts for vastly discrepant research results. The purpose of this paper is to ascertain the relative importance of attitude toward situation (AS) *vis-à-vis* attitude toward object (AO).

On the premise that behavior is a function of the interaction of AO and AS, we hypothesize, following Rokeach (4), that AO, taken by itself, yields unrefined measurement which is inadequately predictive of behavior. The relative "importance" or "strength" of AO and AS varies in magnitude and thus differentially effects a behavioral response or set of responses. *Theoretically,* this is true among research contexts or within a given context, among a set of respondents or in the case of a particular respondent; *empirically,* practical measurement problems dictate upper and lower limits to the specificity/generality of the research context and to the number of subjects/respondents. *Theoretically,* moreover, the relative "importance" or "strength" of AO or AS ranges from 1.00 (completely determinative) through .50 (equally determinative) to .00 (the other is completely determinative)—their values are reciprocal ($AO + AS = 1.00$) and ascertainable; *empirically,* however, at this stage of the development of attitude theory and measurement technique, "more than"/"less than" may be all that can be said.

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B. Method

1. *Data*

The data consist of 152 nonunanimous decisions of the United States Supreme Court (1958-1966 terms). More specifically, the data are the votes cast by each judge in each case; each case is a stimulus, each vote a response. Put another way, each case is a "question" asked by the litigants; the *S*s (judges) answer each question with a vote, just as the respondent to a questionnaire "votes" on each item.

The 152 decisions are divided into two sets (Table 1): Set 1 contains 62 decisions whose designated attitude object (AO) is "Negroes as a disadvantaged racial minority," and an additional 32 cases whose designated AO is "disadvantaged non-Negro minorities." Set 2 contains 58 decisions whose designated AO is "business." AS's are also designated in each set (Table 1): Set 1 contains five subsets of decisions whose designated attitude situations are "desegregation of 'public' facilities," "protest demonstrations," "deprivation of First Amendment freedoms"—e.g., speech, press, or association—"deprivation of voting rights," and "federal court intervention in state judicial proceedings." Set 2 contains four subsets of decisions whose designated attitude situations are "lack of business competition," "state taxation of business," "federal regulation—in the absence of regulatory commission activity—of business 'affected with the public interest,' " and "conflict between federal and state regulation of business."

The foregoing sets and subsets were established via *ad hoc* content analysis: In each case—i.e., the published opinions of the Court and the headnotes accompanying them—the major facts and issues are identified by the reader. The authors and four Ph.D. candidates read the items used here; interrater reliability was .95 (agreement on 144 of 152 items), and unanimous consensus on the eight remaining items was achieved in conference. Subsequent scale and correlation analyses serve further to verify the reliability, as well as the validity of the categories.

The limitations inherent in using data over which no direct control is exercised produce two problems, due in part to empirical exigencies and in part to semantical difficulties.

(*a*) The Set 1 AO designatum is "Negroes as a disadvantaged racial minority"; this formulation contains both an "object" (Negroes) and a "situational context" (being disadvantaged). The Set 2 AO designatum, on the other hand, is simply "business." We find it impossible to formulate any *one* "situational context" for this "object." Perhaps the issues of Negro and other

TABLE 1
AS and AO Linkages in Two Sets of United States Supreme Court Decisions

Set 1					Set 2		
AS	Negro cases	Non-Negro cases	*N*	CR	AS	*N*	CR
Desegregation of "public" facilities (desegregation)	19	—	19	.966	Lack of business competition (antitrust)	25	.975
Protest demonstrations (protest)	25	—	25	.977	State taxation of business (state tax)	16	.978
Deprivation of First Amendment freedoms (First Amendment)	8	11	19	.992	Federal regulation, in the absence of regulatory commission activity, of businesses "affected with the public interest" (federal regulation)	8	.955
Deprivation of voting rights (voting)	4	7	11	1.00			
Federal court intervention in state judicial proceedings (comity)	6	14	20	.987	Conflicts between federal and state regulation of business (national supremacy)	9	.980
AO					AO		
Negroes as a disadvantaged racial minority	62			.935	Business	58	.901
Disadvantaged non-Negro minorities		32		.922			

minority group rights involved in Set 1, which are still very much unsettled, are more salient to respondents than are the economic issues involved in Set 2, which were the major problems of an earlier era.

(*b*) Whereas the AO of all four Set 2 subsets is "business," the AO of 32 decisions in three of the five Set 1 subsets is not "Negroes." See Table 1. In each case, however, the litigant (the object of *S*s' attitudes) is a member of a "disadvantaged" or "negatively sanctioned" minority—members of other ethnic/racial minority groups, political "extremists," purveyors of pornography, and an occasional "orthodox" criminal—groups which for purposes of analysis can be considered comparable (they are all discriminated against because of their unorthodoxy). At any rate, we deem the inclusion of cases with a common AS but different AO's to be an additional control in testing our hypotheses and in assessing the relation of AS to AO.

2. *Hypotheses*

Hypothesis I. *S*s' behavior is a function of the interaction of two attitudes—attitude toward object (AO) and attitude toward situation (AS).

Hypothesis IIa. For each of the two sets of data, *S*s' behavior is differentially affected by AO and AS.

Hypothesis IIb. For each of the two sets of data, the relative magnitudes of AO and AS are empirically ascertainable.

Note that we are dealing here with the responses of *S*s as a group; although our data permit analysis of each individual respondent for each set of decisions, this is beyond our present concern.

Hypothesis IIIa. For Set 1 (Negroes), *S*s' behavior is dominated, though not completely determined, by AO.

Hypothesis IIIb. For Set 2 (business), *S*s' behavior is dominated, though not completely determined, by AS.

3. *Procedure*

Two major techniques are used to test our hypotheses: cumulative scaling and rank-order correlation. The first orders *S*s *along* each attitudinal dimension; the second compares the order of *S*s *among* attitudinal dimensions.

Cumulative scales (1) of the votes of the *S*s in the various sets and subsets are constructed, not only to help determine the relative importance of AS *vis-à-vis* AO, but also to insure that the voting behavior of each judge is a function of the interaction between an AO and an AS which are, in fact, common to all *S*s.

The behavior upon which we focus is naturally dichotomous; a judge's vote is cast in favor of one litigant, against the other. In the Set 1 scale and subscales a positive vote is defined as one which supports the claim of the Negro or non-Negro litigant who has been negatively sanctioned; in the Set 2 scale and subscales a positive vote is defined as one which is antibusiness. The coefficients of reproducibility (CR) for the Negro, non-Negro, and business scales, along with the nine subscales, are displayed in Table 1.

The Set 1 Negro scale contains only the 62 decisions whose AO is "Negroes as a disadvantaged racial minority." This scale, accordingly, tests the "Negro" AO across AS's. Three of the Set 1 subscales, "First Amendment," "voting," and "comity," contain both Negro and non-Negro cases, as listed in Table 1. These subscales, then, test AS across AO (this is the additional "control" mentioned above). The two other Set 1 subscales, "desegregation" and "protest," contain a common AO (Negroes), as well as a common AS.

TABLE 2

RANK ORDER CORRELATIONS BETWEEN SUBSCALES OF SUPREME COURT DECISION MAKING
(Correlations above the principal diagonal, significance levels below)

Subscale	Set 1 ($N = 12$) 1	2	3	4	5	Subscale	Set 2 ($N = 12$) 1	2	3	4
1. Desegregation		.73	.72	.80	.56	1. Antitrust		.56	.52	.11
2. Protest	.002		.48	.79	.84	2. State tax	.02		.31	.17
3. First Amendment	.001	.03		.69	.50	3. Federal reg.	.02	.10		.14
4. Voting	.0003	.001	.002		.70	4. Nat'l supremacy	.32	.26	.29	
5. Comity	.005	.0004	.01	.001						

The second stage of the procedure is to rank order the Ss from 1 to N on the basis of their individual breakpoints in each subscale.[2] Tau-b rank order correlations (2) were computed for each pair of subscales with the use of a CDC 3600 computer (3). The correlation coefficients and their significance levels are displayed in the cells of the matrices of Table 2.

By comparing each pair of subscales in this fashion, we test to what extent their unique feature (different AS's) or their common feature (the same AO) determines behavior. Furthermore, because three of the Set 1 subsets have different AO's *and* different AS's, an analysis of the *interaction* of AO and AS is possible; hence, the matrices displayed in Tables 3 and 4 enable us to test (*a*) AS across AO, (*b*) "Negro" AO across AS's, and (*c*) "non-Negro" AO across AS's. Unfortunately, the small number of items in these sub-subscales renders this much more powerful and elegant test somewhat ambiguous in terms of its reliability.[3]

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[2] 1 = most supportive of the claims of Negro and negatively sanctioned litigants in the Set 1 subscales; 1 = most antibusiness in the Set 2 subscales.

Our procedure tests the hypotheses in that it identifies (*a*) the AO's, AS's, or both, which determine *S*s' behavior, and (*b*) the amount of variance accounted for by each. Thus, it is a simple matter of finding or not finding systematic differences. For example, the null hypotheses (no differences) would

TABLE 3
Rank Order Correlations across the AOs and ASs of Three Set 1 Subscales
(Correlations above Principal Diagonal, Significance Levels below)

AO	AS	Negro 1	Negro 2	Negro 3	Non-Negro 1	Non-Negro 2	Non-Negro 3
Negro	1. First Amendment		.17	.28	.91	.66	.41
	2. Voting	.261		.58	.34	.88	.71
	3. Comity	.166	.014		.49	.62	.80
Non-Negro	1. First Amendment	.001	.100	.044		.74	.46
	2. Voting	.005	.001	.010	.003		.44
	3. Comity	.061	.004	.003	.032	.050	

TABLE 4
Four-Fold Tables of Rank Order Correlations across and within the AOs of Three Set 1 Subscales

AS	AO	First Amendment Negro	First Amendment Non-Negro
Voting	Negro	.17	.34
	Non-Negro	.66	.74

AS	AO	Voting Negro	Voting Non-Negro
Comity	Negro	.58	.62
	Non-Negro	.71	.44

AS	AO	Comity Negro	Comity Non-Negro
First Amendment	Negro	.28	.41
	Non-Negro	.49	.46

be accepted, and our hypotheses rejected, if (*a*) the "parent" (AO) scales and their (AS) subscales were of relatively equal quality (Table 1). This is clearly not the case; the subscales have a CR an average of .060 greater than their "parent scales," and they contain an average of 20 fewer nonscale responses. (*b*) The intercorrelations among subscales were uniformly high and significant (Table 2). This is clearly not the case for Set 2, and even Set 1 shows some disparities. (*c*) The intercorrelations among the Negro and non-

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[3] The *N*s range from five to 14, producing numerous ties in the rankings of *S*s. The CRs are 1.00 in the three "Negro" and "non-Negro-voting" sub-subscales, .988 in the "non-Negro First Amendment" sub-subscales, and .980 in the "non-Negro-comity" sub-subscale.

Negro subscales (Tables 3 and 4) were uniformly high and significant across AS (the triads of Table 3) and uniformly low and insignificant across AO (the diagonal of Table 3). This is clearly not the case; in fact, exactly the opposite obtains.

A simple perusal of Tables 1 through 4 clearly indicates, then, that there are systematic differences to be explained, differences left unaccounted for when using a one-attitude theory. Our two-attitude theory, on the other hand, predicts such results. We now analyze these differences and examine to what extent (if any) our theory accounts for them.

C. RESULTS

The fact that the Negro, non-Negro, and business Sets scale above minimally acceptable levels does not automatically warrant the conclusion that AO determines *S*s' behavior or that AO dominates AS. In most attitude research, analysts conclude that they have reliably and validly measured an attitude (presumably AO, since the distinction between AO and AS has not previously been explicated) if it scales above the conventional CR level and, perhaps, if factor analysis yields a dimension which can be equated with the scale (no matter how much of the variance the first factor accounts for nor how many other "interpretable" factors are generated). However, we have two reasons for skepticism regarding such results:

(*a*) The small size of the Court, its stable membership, the frequency of interaction (and the norms governing it) among the judges, the practice of verbally rationalizing one's vote through written opinions, the superior capacity of the judges to communicate and to generalize, and the institutional framework of the Court's decision-making all suggest that highly uniform behavior (consistent responses to similar—and even not so similar—stimuli) is manifest to an unusual degree. In fact, exceedingly gross cumulative scales, encompassing as much as 40 percent of the nonunanimous decisions of a term of the Court, have been constructed with a CR at or above the conventional minimum of .900 (6, 7).

(*b*) Evidence culled from our own data casts further doubt that AO determines *S*s' behavior or that AO dominates AS in their responses. The Set 1 (Negro) scale contains 26 nonscale responses from among 401 computable votes;[4] its five subscales contain only eight, increasing CR from .935 to .980. The Set 1 (non-Negro) scale contains 18 nonscale responses from among

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[4] Computable votes are those in cases with more than a solo dissent. Cases with but a solo dissent exceed the 80 percent marginal criterion and thus are excluded from the calculation of CR (1, p. 78).

204 computable votes; its three subscales contain only three, increasing CR from .922 to .985. The Set 2 (business) scale contains 36 nonscale responses from among 365 computable votes; its four subscales contain only ten, increasing CR from .901 to .973. Consequently, we do not find the minimally acceptable levels of reproducibility of the "parent scales" particularly persuasive; indeed, to do so would be to abandon both our theory and the data and to further confound the discrepant findings of earlier research.

What our data do indicate is that, at least for the Set 2 (business) cases, AS dominates AO in determining *S*'s behavior. The minimum CR (.901) and the high number of nonscale responses (10 percent of the total) gave some indication of this, and the Set 2 matrix of Table 2 clearly confirms it. Only two of the six pairs of subsets (antitrust with federal regulation and antitrust with state taxation) correlate significantly (at .02), and even these two coefficients are unimpressive (.52 and .56); thus, the relative magnitude of AS to AO is at least .67 to .33 (four of six pairs of subsets). Although attitude toward situation does not completely determine *S*s' behavior, it obviously dominates attitude toward object.

A somewhat stronger case can be made for the dominance of AO in the Set 1 items. The parent Negro scale was found to be reasonably sturdy, and seven of the ten pairs of subscales correlate at or above .70, well beyond the .01 level of significance, as Table 2 shows; thus, AO *seems* to dominate AS by the ratio .70 to .30 (seven of ten pairs of subsets). However, various aspects of our data indicate that the attitude "object" "Negroes" is less relevant to the analysis than is the "situational context" "disadvantaged."

This is most strongly demonstrated by the pattern in Table 3. First, the three highest correlations are between common *AS* pairs (with the fourth highest coefficient linking a *non-Negro* pair), while seven of the remaining 12 coefficients are less than .50 and four of them are not significant even to the .05 level. Furthermore, Table 3 shows that, across AS's, the "Negro" AO dominates behavior appreciably *less* than does the "non-Negro" AO; the average correlation for the three "Negro" sub-subscales is .34, whereas that for the three "non-Negro" sub-subscales is .55. Finally, the pattern in the fourfold tables of Table 4 shows a trend toward slightly higher correlations *across* AO's rather than *between* pairs with a common AO; the average correlation across AO's in the three Table 4 matrices is .54, while that for the common AO pairs is .45.

Tables 2 and 3 also provide some ancillary evidence that the relevant AO in the Set 1 cases is *not* "Negroes as a disadvantaged racial minority," but rather some more general class of disadvantaged minorities. First, both of the purely Negro subscales in Table 2 ("desegregation" and "protest") correlate more highly with some of the other subscales, which contain non-Negro, as well as Negro items, than they do with each other. Second, the set of cases whose AS is "First Amendment" (which probably involves less "crucial" deprivations or less "disadvantaged" groups) constitutes the weakest link in the Set 1 matrix of Table 2 and in the matrix of Table 3. (In Table 2, two of the three low correlations, and in Table 3, all four of the statistically insignificant correlations ($p > .05$) have "First Amendment" as one of their elements.) We deem all of these findings conclusive proof that *S*s' behavior is not a function of the AO "Negroes."

Evidence adduced so far has shown that if, indeed, AO dominates *S*s' behavior at all in the Set 1 cases, it is the "situationally defined" (disadvantaged or unorthodox minorities) rather than the "objective" (Negroes) AO which is operative. Moreover, Table 3 contains evidence that even this more broadly defined AO may not dominate AS in determining *S*s' behavior. The highest correlations in Table 3 are those between the three common AS pairs. The average correlation for these three pairs is .86, more than 30 points higher than the average for any other group of AO cells in the matrix of Table 3.[5] However, the small size of several of these sub-subscales and our consequent inability to rank all of the *S*s as distinctively as is possible in the "business" and "Negro" scales makes us less confident of the reliability of inferences drawn from Tables 3 and 4 than we would be if the cases were more numerous and their marginals more variegated.

D. CONCLUSION

We deem our findings to have verified Hypothesis I and the theoretical propositions from which it derives. Likewise, our measurement hypotheses (IIa and IIb) are confirmed—with the exception that we cannot specify with certitude numerical values for the relative magnitudes of AO and AS in Set 1. Hypothesis IIIb is also confirmed; IIIa, however, must be reformulated as follows:

IIIa_1 *S*s' behavior is dominated by AS more in Set 2 (business) than in Set 1 (Negroes).

IIIa_2 For Set 1 (Negroes), *S*s' behavior is dominated more by the "situationally" defined AO than it is by the "objectively" defined AO.

IIIa_3 For Set 1 (Negroes), the relative magnitudes of AO and AS are indeterminate, but both are important in determining *S*s' behavior.

We find, then, (*a*) that behavior is a function of at least two attitudes—attitude toward object and attitude toward situation. (*b*) That AO and AS differentially effect behavior. There is no *a priori* basis for determining to what extent each is operative. Each response to each item—and certainly each *set* of responses to each *set* of items—involves an empirically ascertainable combination of relative magnitudes of AO and AS. (*c*) That in the case of our data, AS is more predictive of behavior than is AO. In the Set 2 (business) items, the relative magnitude of AS to AO is at least .67 to .33. In the Set 1 (Negro) items, the relative magnitude of AS to AO appears to be about .30 to .70; more detailed analysis, however, leads us to conclude that the AO "Negroes as a disadvantaged racial minority" does not determine *S*s' behavior. It is determined, rather, by the interaction of the situational AO (disadvantaged or unorthodox minorities, Negro and non-Negro alike) and AS. We estimate the relative magnitude of this AO to AS to be $\geqslant .40 \leqslant .50$ to $\geqslant .50 \leqslant .60$.

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[5] These other averages from the cells in Table 3 are .34 for the "Negro" AO, .55 for the "non-Negro" AO, .54 across AO's, and .45 for the common AO pairs.

E. SUMMARY

On the premise (4, 5) that behavior is a function of the interaction between attitude toward object (AO) and attitude toward situation (AS), nonexperimental data, drawn from United States Supreme Court decision making, were used to test the relative magnitudes of AO and AS in differentially effecting behavior. Cumulative scales of the decisions were constructed and rank order correlations derived therefrom. The data show that *S*s' behavior is a function of AO-AS interaction, with AO and AS differentially effecting behavior. The extent to which each is operative is an empirically ascertainable combination of their relative magnitudes. For our data, AS proved considerably more predictive of behavior than AO.

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THE COURSE OF INDUCED CRYING ACTIVITY IN THE NEONATE*[1]

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A. Introduction

Recently a number of studies have been reported on the behavior of the neonate. Two of these investigations (9, 10) deal exclusively with the infant's cry, while the others include crying activity in their more general surveys (4, 5). Studies currently in progress at the Long Island Jewish Hospital concerning the diagnostic potential of the cry suggested the need for a developmental survey of crying activity in the neonatal period (7).

B. Subjects and Procedures

The subjects of this study were 54 infants who were observed longitudinally for the first four days of life. Fifty-two of these subjects were the same infants who were included in a previous study on the intercomparisons among the signs of the Apgar scale (8).

Tape recordings of the cries of the infants were made at the following intervals after birth: one minute (Apgar scoring time), ten minutes, then two, four, six, 24, 48, 72, and 96 hours after birth. All cry samples, with the exception of those obtained one minute after birth, were elicited by using a rubber band stimulation (RBS) and a technique which is fully described elsewhere (7). The cry samples recorded at the one-minute interval were obtained as a result of the normal obstetrical handling of the infant.

In addition, samples of crying were also recorded for 70 other infants, studied "cross-sectionally." There were ten different infants at each of the successive age levels mentioned above, starting at two hours. These "cross-sectional" infants were employed as a check against any possible adaptation effects which might have occurred in the longitudinal group; whereas the longitudinal infants underwent stimulation at all of the successive age intervals from ten minutes up to and including 96 hours of age, the "cross-sectional" subjects experienced stimulation only once, ten subjects at each age level up to and including 96 hours. Since the program of uniform rubber band stimulation began at the ten-minute interval in the longitudinal group, any adaptation-to-stimulus effects would not be evident until the next test session at two hours. Therefore, the first group of ten "cross-sectional" subjects was taken at two hours.

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All subjects (*S*s) in this study were considered to be normal at the time of discharge from the hospital, usually on the fifth day of life. The tape recordings were analyzed in terms of three measures. (*a*) Threshold: the number of stimuli required to produce a minute of crying, (*b*) Bursts: the number of loud and explosive vocalizations which in the young infant are usually brief and followed by gasping for air or breath-holding, and (*c*) Cumulative Time: the total amount of time spent in actual crying in each one-minute sample.

These three measures, Threshold, Burst, and Cumulative Time, were combined in the following manner to yield a single measure (Cry Index or C.I.) of crying activity: Bursts were added to Cumulative Time and multiplied by a conversion value for Threshold. If the infant cried for one minute without having the rubber band stimulator applied to his foot, the sum of Bursts and Cumulative Time was multiplied by 100 percent, by 95 percent if one RBS produced a minute of crying, by 90 percent if two RBS's were required, and so on down to 60 percent for eight RBS's, and by 50 percent for the infant who did not give a minute of crying after the eighth and terminal stimulus. Since at one minute of age standard procedures could not be employed because of reasons previously cited, no Threshold was established, and the conversion value for Threshold therefore was not used. This lack of conversion could tend to make the one-minute scores higher than the C.I.

It was felt that greater reliability could be achieved by dealing with the Cry Index than by studying each measure separately, since the C.I. combines at least three major features of crying activity—*sensitivity* (Threshold), *output* (Bursts), and *duration* (Cumulative Time). Statistical justification for this combination rests in the fact that no significant interactions were found for these three measures over the four-day interval. This meant that the three measures followed similar patterns over the four-day interval, thus they could be combined without altering conclusions about four-day patterns of crying activity. In addition, the interhour reliability coefficients (reported below) were generally higher for C.I. than for any of the measures taken singly.

The subjects were divided into two groups according to their Apgar scores.

*S*s with Apgar of six or less were designated "Low" Apgar (the lowest Apgar score in this study was four), those infants with scores of eight or greater were designated High Apgar. The five *S*s with Apgar scores of seven were eliminated from the statistical analyses, since Apgar seven seems to be a marginal score (2). In addition, there were 13 *S*s whose data were incomplete, usually because they were discharged from the hospital before 96 hours of age. Thus, the following groups remained: (*a*) High Apgar, $N = 24$ (17 Males, 7 Females); (*b*) "Low" Apgar, $N = 12$ (8 Males, 4 Females); (*c*) "Cross-Sectional," $N = 70$ (34 Males, 36 Females).

It was not feasible to divide the "cross-sectional" subjects into High and "Low" Apgar groups, since there were only ten infants in each group, with no uniform distribution of scores. Eliminating the scores of 7 would further reduce some of the sample sizes.

While the entire program of reaction to stimulation was audited for each subject, only the infant's "best effort" was used in the statistical analysis. "Best effort" was defined as that response which yielded the longest Cumulative Time. In this study, 60 seconds was set as the limit.

C. Results and Discussion

The means and standard deviations are given in Table 1 for each group separately at the various ages studied. The most striking feature of the Table is the high degree of variability in crying activity at all age levels for all groups. The relative magnitude of the standard deviations shown suggested the use of nonparametric statistics and, accordingly, the median values are also presented.

When the means are plotted against age they appear as in Figure 1, whose abscissa is not shown strictly according to scale. A plot of the medians does not change the picture markedly. The overall trend is clear; the curves show a drop in the cry index for all three groups with subsequent recovery for all. The deepest trough is at four hours for the "Low" Apgar infants. It is significantly lower than the corresponding value for the High Apgar infants (Median test, $\chi^2 = 3.125$; $p < .05$, 1 tail), but it is not significantly different from the "cross-sectional" value (Median test, $\chi^2 = .183$; $p > .05$). Thus, it appears that the "Low" Apgar infant enters the "depressed" interval earlier and more intensely than the "High" Apgar infant. By six hours of age, however, he is more responsive to stimulation than he was previously, and his score is not significantly different from the other infants.

It should be noted at this point that not all of the High Apgar infants depress at six hours and not all of the "Low" infants at four hours. If the ten-minute cry score is used as a base, 19 of the 24 High infants had relatively depressed scores at either two, four, or six hours (or combinations of these intervals). In the "Low" group only one of the 12 infants did not show relatively depressed crying at one or another or combinations of these periods. Thus, the majority of all *S*s showed depressed activity somewhere in this two- to six-hour period. In addition, the shape of the curves remain generally the same when based on the full complement of 54 subjects.

TABLE 1

MEANS, MEDIANS, AND STANDARD DEVIATIONS OF THE CRY INDEX

Measures	1 min.	10 min.	2 hrs.	4 hrs.	6 hrs.	24 hrs.	48 hrs.	72 hrs.	96 hrs.
High Apgar Group ($N = 24$)									
Mean	72.8	48.8	40.6	37.0	29.8	44.6	53.1	52.3	61.8
Med.	72	56	31	28	20	24	62	52	64
SD	18.0	28.0	30.6	31.0	29.6	37.4	31.8	28.8	25.6
"Low" Apgar Group ($N = 12$)									
Mean	47.7	47.0	27.9	18.8	39.6	47.1	53.1	66.6	74.6
Med.	50	44	15	10	48	43	59	70	76
SD	19.6	27.5	28.3	25.2	27.2	31.6	34.1	31.7	17.2
"Cross-Sectional" Group ($N = 10$ at each age)									
Mean	—	—	35.9	30.8	44.6	58.5	73.1	64.6	63.1
Med.	—	—	26	14	48	62	68	70	68
SD	—	—	24.2	25.4	26.2	26.4	20.8	32.1	23.8

It is of further interest to note that when the infants were classified according to their Apgar scores minus the two signs involving cry, the same trends appear in the plot of their cry indices over the four-day period.

The cause of this depression is not immediately clear to us. It may be due quite simply to fatigue—"neurological fatigue" [according to Desmond (3)]. The effort expended in the act of birth, the transition from placental to pulmonary breathing, the violent and sudden extension of the diaphragm, possible chilling in the immediate postnatal period, the type of delivery, perhaps even the sedative effects of drugs administered to the mother in labor; all may contribute to the depression found in these early hours of life.

The median test was performed for all the differences between groups at each age level. Yates correction for continuity was used routinely. Apart from the one-minute cry and the four-hour cry, already mentioned, none of the chi square values was significant. The fact that the one-minute cry was significantly greater for the High rather than "Low" Apgar infants (Median test,

$\chi^2 = 6.125$; $p < .01$) is not surprising, since two of the five segments of the Apgar score involve crying.

As mentioned earlier, the "cross-sectional" group was used in this study to avoid the possible pitfall of adaptation to painful stimulation which is present in the longitudinal groups. In this regard, it is worth noting that both the "Low" and the "cross-sectional" groups cross over the High group somewhere between four and six hours, and generally speaking they stay there. This is very suggestive of an adaptation effect for the High group. Although the non-

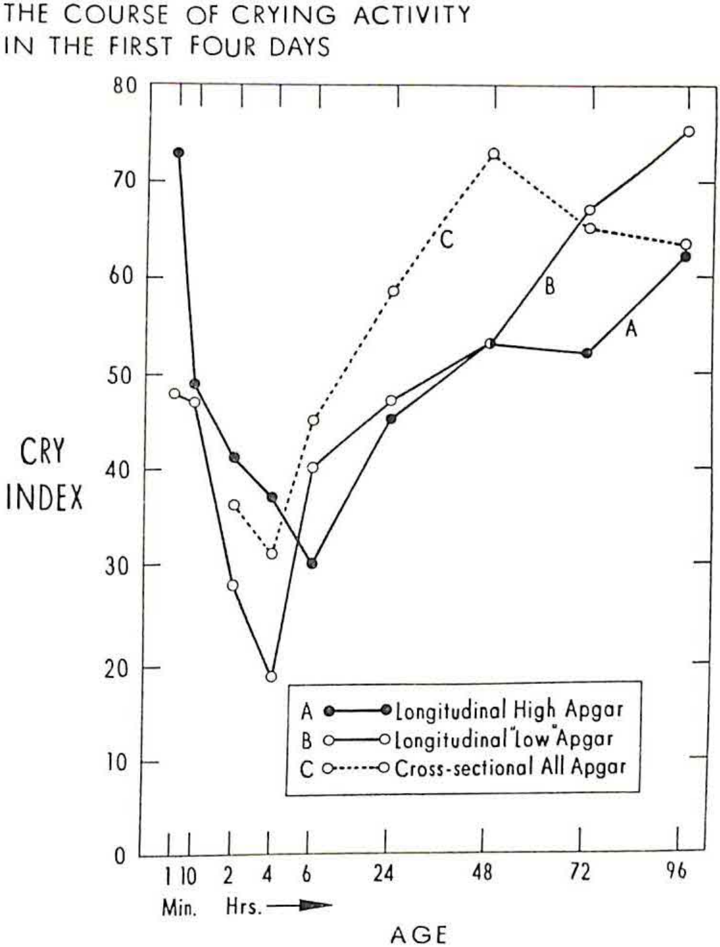

FIGURE 1

parametric tests for the differences between the groups after four hours show no significant differences, the direction of the differences is uniform.

Apart from the question of group differences, the differences between successive samples within each group were also studied. The Wilcoxon T and R values (6) are given in Table 2.

The patterns of significance support the impression obtained from inspection of Figure 1. In the High group the six-hour cry is significantly different from all others but the four-hour cry. In the "Low" group the four-hour cry is significantly different from all but the two-hour sample. This is also true of the "cross-sectional" group, except that there is no significant difference between the four and six-hour samples. No significant differences were found among the 48-, 72-, and 96-hour cries. This is true in all three groups and it is of particular importance to us, since many of our cry samples are taken in the

TABLE 2
WILCOXON T AND R VALUES

	10 min.	2 hrs.	4 hrs.	6 hrs.	24 hrs.	48 hrs.	72 hrs.	96 hrs.
				T values for the High Apgar Group				
1 min.	—34**	— 28**	— 17**	— 10**	— 48**	— 56**	— 71*	— 96
10 min.		—114	—103	— 74*	—140	+122	+140	+ 92
2 hrs.			—122	— 72*	+127	+ 87	+100	+ 58**
4 hrs.				—110	+ 92	+ 90	+ 94	+ 55**
6 hrs.					+ 58**	+ 27**	+ 59**	+ 29**
24 hrs.						+ 97	+116	+ 75*
48 hrs.							+145	+ 89
72 hrs.								+107
				T values for the "Low" Apgar Group				
1 min.	+37	— 17	— 11*	— 28	— 38	+ 29	+ 36	+ 8*
10 min.		— 20	— 5**	— 27	± 39	+ 19	+ 18	+ 13*
2 hrs.			— 28	+ 21	+ 16	+ 6**	+ 6**	+ 0**
4 hrs.				+ 8*	+ 12*	+ 11*	+ 3**	+ 2**
6 hrs.					+ 27	+ 14	+ 5**	+ 4**
24 hrs.						+ 30	+ 26	+ 9*
48 hrs.							+ 19	+ 21
72 hrs.								+ 35
				R values for the "cross-sectional" Group				
2 hrs.			93	96	79*	69**	77*	79*
4 hrs.				96	72*	69**	72*	74*
6 hrs.					89	77*	87	83
24 hrs.						95	97	101
48 hrs.							98	96
72 hrs.								100

* $p < .05$ (2 tail).
** $p < .01$ (2 tail).

hospital nursery at one or another of these age levels prior to the discharge of the infant.

The increase in cry activity from one to four days is consistent with the previous observations of Aldrich *et al.* (1). The findings also confirm the high degree of variability in the behavior of the newborn reported by Desmond *et al.* (4).

Table 3 presents the cry index intercorrelations among the various ages studied for the High and "Low" Apgar groups. The C.I. appears as a significantly reliable measure of crying activity for both groups in the first two days of life, and more so for the High rather than the "Low" group. Beyond that none of the intercorrelations are significant.

TABLE 3
PEARSON PRODUCT-MOMENT CRY INDEX INTERCORRELATIONS

AGE	2 hrs.	4 hrs.	6 hrs.	24 hrs.	48 hrs.	72 hrs.	96 hrs.
			High Apgar Group $N = 24$				
10 min.	.22	.19	.24	.43*	.43*	.06	—.36
2 hrs.	—	.71**	.75**	.50*	.59**	.28	.27
4 hrs.	—	—	.74**	.52**	.40†	.09	.20
6 hrs.	—	—	—	.57**	.69**	.25	.24
24 hrs.	—	—	—	—	.63**	.23	.15
48 hrs.	—	—	—	—	—	.22	.38
72 hrs.	—	—	—	—	—	—	.27
			"Low" Apgar Group $N = 12$				
10 min.	.10	.47	.32	—.12	.39	.28	—.35
2 hrs.	—	.68*	.62*	.25	.11	.26	—.23
4 hrs.	—	—	.51	.30	.22	.35	—.17
6 hrs.	—	—	—	.58*	.61*	.57	.21
24 hrs.	—	—	—	—	.63*	.13	.42
48 hrs.	—	—	—	—	—	.46	—.12
72 hrs.	—	—	—	—	—	—	—.01

* $p < .05$ (2 tail).
** $p < .01$ (2 tail).
† The computed value = .404 which is significant at the .05 level.

It is, therefore, quite clear that studies of crying activity in the very young infant should specify age carefully, since the same group studied on different days may be traveling through a period of consistency in relative performance to one of no correlation at all.

This investigation also makes clear the need for active experimental research at the newborn level, where, for example, the "naturalistic observation" type of study would, in the present instance, have revealed little more than the fact that the newly born infant sleeps about 80 percent of the time. The stimulation with rubber band prodding of the subjects in this study revealed individual differences in reactivity not only in intensity but varying with time.

D. SUMMARY

The course of crying activity was traced at successive intervals over the first four days of life for 24 infants with Apgar scores from 8-10 (High Apgar group) and 12 with Apgar scores from 4-6 ("Low" Apgar group). These 36 infants were studied longitudinally. In addition, 70 infants were studied "cross-sectionally" (ten at each of seven time intervals corresponding to those in the longitudinal group). A Cry Index (C.I.) was devised incorporating cumulative time of crying, the number of bursts in the cry, and threshold. The findings indicate:

1. The curves describing cry activity show a drop at four to six hours for all three groups with subsequent recovery for all. The deepest trough is at four hours for the "Low" Apgar infants and it is significantly lower than the corresponding value for the High Apgar infants.
2. No differences were found between the "Low" Apgar and the "cross-sectional" groups in crying activity.
3. Crying activity is depressed at four hours for the "cross-sectional" and "Low" Apgar infants, and at six hours for the High Apgar group.
4. It is suggested that the depression in cry activity for the majority of infants between two and six hours after birth is traceable to fatigue caused by birth itself and other prenatal, perinatal, and postnatal factors.

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THE USE OF IMAGERY IN THE MODIFICATION OF ATTITUDES TOWARD THE ELDERLY: A PRELIMINARY REPORT*

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A. INTRODUCTION

There is ample evidence to indicate that elderly people as a class are the recipients of negative attitudes from the public in general (5, 17, 26, 27, 33) and from specific population groups, as college students (11, 23), juveniles (13), and professional personnel (14).

Little work has been done to develop a procedure to systematically change the attitudes of specific persons toward the elderly except through programs of education and training, such as the one reported by Farrar and Bloom (19).

Some studies utilizing a behavioral conditioning model have successfully modified attitude behavior (6, 18). Buckhout and Rosenberg (6) manipulated two types of verbal reinforcement on attitudes expressed in a structured interview setting and found that a combination of positive and negative reinforcement produced a significant immediate modification of attitudes expressed in the interview. Whether this change generalized to the environment outside the interview setting is not known.

Early (18) employed a classical conditioning paradigm to significantly change the attitude behavior of elementary school children toward "social isolates" in the classroom. The measure of behavior used was change in free play activity toward each experimental isolate when contrasted with the same measure of behavior toward control isolates.

Both of the above conditioning studies have modified attitude behavior by manipulating external stimuli in relation to attitudes. Recent behavior therapy procedures indicate that behavior change can result from the manipulation of imagery.

Since 1958 when Wolpe (35) introduced the technique of systematic desensitization based on relaxation, the manipulation of imagery has become an important vehicle for behavior modification. Desensitization involves the pres-

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entation in imagination of anxiety-provoking items in hierarchical form ranging in degrees from least anxious to most anxious until the *S* can imagine the items without feeling nervous or upset. That this technique can successfully eliminate maladaptive avoidance behaviors has been demonstrated by Davison (15), Lang (24), Lang, Lazovik, and Reynolds (25), and Paul (31).

Covert Sensitization, a technique developed by Cautela (8, 9) for the modification of maladaptive approach behaviors, involves the pairing in imagination of aversive stimuli with the desirable stimulus (e.g., homosexual contact, food, alcoholic beverage, cigarette). The procedure has been found to effectively eliminate excessive alcoholic drinking (1, 2), obesity (32), smoking (30, 34), homosexuality (4, 12), and sadistic fantasy (16).

Lazarus and Abramovitz (26) developed the reciprocal inhibition technique of "emotive imagery" for the treatment of children's phobias. Instead of utilizing the usual Wolpe procedure of relaxation in desensitization, these authors induced certain emotion-arousing situations and presented them in imagination to children with various phobias. They reported that seven of nine children treated recovered in a mean of 3.3 sessions and that follow-up inquiries 12 months later revealed no relapse or symptom substitution.

While these techniques have been primarily applied to overt behavior problems, therapists working with patients have frequently noted that changes in thinking, personal feelings, and attitudes often result from changes in behavior (7). Several experiments and studies by various investigators concerned with the effects of self-evaluative statements on behavior (3, 20, 21, 22, 29) have indicated definite positive behavioral changes as a result of "self-reinforcing" statements. Marston (29) considers covert self-reinforcements to be as influential on behaviors as overt self-reinforcements. According to Cautela (10), the behavior therapist can influence covert self-reinforcing responses in two ways: by reinforcing positive statements expressed by the patient or by modifying behavior in such a way that the patient is more likely to make self-reinforcing statements after he observes his own behavior.

The above studies demonstrate that behavior conditioning procedures can affect attitude change and that other kinds of behavior change have resulted from the manipulation of imagery.

The purpose of this study was to attempt to change the attitudes of college students toward the elderly by the manipulation of imagery. In this experiment we paired (in imagination) a reinforcing situation with an elderly person. It was hypothesized that the pairing of a reinforcing event with an elderly individual will by counter conditioning result in behavior change toward elderly people in general.

B. METHOD

1. *Subjects*

Ninety-three undergraduates at Boston College were used as *S*s. It was later necessary to exclude the data from 44 *S*s who were absent one or more times when the material was presented. As a result, data from 49 *S*s was considered acceptable. Eleven of this number were females. The experimental group was composed of 23 *S*s enrolled in a general psychology class; the control *S*s ($N = 26$) were members of another general psychology class.

2. *Procedure*

An attitude questionnaire was constructed from a scale developed by Kogan (23) for the measurement of attitudes toward elderly persons. An additional six items were included by the experimenters, which resulted in a checklist of 18 positive statements and 22 negative statements concerning elderly persons. *S*s were asked to rate each item along a scale of varying degrees of response intensity (i.e., Agree strongly; Agree; Disagree; Disagree strongly; No opinion).

Both the experimental and control groups were given the attitude questionnaire and told simply to complete it for a study. One week later the experimental group received the following instructions: I want you to imagine this scene as vividly as you can:

> You have been in a car accident and are lying on the ground. An artery in your arm has been severed and is bleeding badly. You are in pain. A kind elderly man comes upon the scene and applies pressure to your wound with a clean handkerchief and holds your hand in a reassuring way, while he smiles at you. The police come and put you in an ambulance. The next day you hear two doctors talking and one says, "If it wasn't for that kindly old man, the patient would have died."

This scene was repeated for them by the experimenter and then the *S*s were asked to imagine it once more, picturing themselves as the old man. Finally they were told to practice both scenes at home at least twice a day. No mention was made of the previously administered questionnaires, nor did any student ask questions concerning them. Five days after these scenes were presented in class, the experimenter reminded the group to practice them at home. He did not present the scenes again in class. Five days after this reminder, the attitude questionnaires were once more administered to both groups of *S*s. At this time *S*s in the experimental group were also asked to answer the following questions: (*a*) How many times did you practice the scenes at home? (*b*)

Rate the clarity of the images on a scale from one to five, where five means "very clear." (*c*) What do you think was the purpose of the study?

Each questionnaire was scored after each presentation. Each *S* received a total positive and negative score, based on the way in which he answered each question and to what degree the response was made. Responses on the more extreme ends of the scale were weighted more heavily than the others. Responses of "no opinion" were not assigned a score. The total negative score was subtracted from the total positive score to achieve one composite score for each *S*.

C. RESULTS

There was a significant difference at the .01 level in a positive direction for the experimental group between the first and second administrations of the attitude questionnaires. There was no significant difference in the control group. In fact, there was a slight tendency for the scores in the control group to become more negative.

There also appears to be a relationship between the number of times the *S*s reported practicing the scenes at home and the increase in positive scores. The *S*s who practiced more often received a significantly ($p < .01$) higher score in the positive direction. A control group of *S*s randomly selected not only did not increase their scores, but showed a decrease in scores in a decidedly negative direction. This relationship between the amount of practice and the degree of positive change can be expected from a conditioning paradigm.

D. CONCLUSIONS

It appears evident that in the sample population used for this study the attitudes about elderly persons which were expressed on self-report scales were changed significantly in a positive direction due to the imagery technique. If further experimentation reveals that the differences between the two groups is due to the experimental variable, the procedure promises to be a powerful tool in the alteration of attitudes. The procedure appears even more promising when one considers that most *S*s did not repeat the assigned scenes each day. In fact, compared with patients in private therapeutic practice who are given similar assignments, these *S*s practiced an extremely small amount of trials. This difference, of course, can be attributed to the higher motivation of patients to modify maladaptive behaviors rather than to merely cooperate with a professor.

It was not the purpose of this experiment to measure attitude changes by other methods which would provide more validation for the technique employed (e.g., observations of the *S*s' behavior in social interactions with elderly persons), but such measures would certainly be important.

Further experimentation is currently underway to determine the effect of the manipulation of other variables on the use of a more refined imagery technique, called "Covert Reinforcement" in which *S*s are reinforced with a pleasant scene each time they engage in anxiety-provoking behavior in imagination. Further studies are needed in which investigators attempt to measure: if the daily presentation of scenes by the experimenters will produce a greater or lesser degree of attitude change; how long the changes in attitude persist after discontinuance of the technique; and which types of reinforcing situations produce the highest degree of attitude change.

The implications of this study are far-reaching. If further experimentation demonstrates the continued efficacy of this technique in changing negative attitudes in a positive direction with the aged, an attempt can be made to change other negative attitudes in such areas as ethnic and minority groups, political systems, etc. It will also be necessary to consider the ethical implications of the availability of such a procedure and its application for attitude changes in a desired direction.

E. Summary

Forty-nine undergraduate *S*s received a checklist composed of 18 positive statements and 22 negative statements about elderly persons. *S*s were asked to rate each item along a scale of varying response tendency according to how they felt about each item. One week later the experimental group of *S*s was asked to imagine a scene in which their lives were saved by an elderly person. They were told to practice imagining this scene twice a day. Ten days later the experimental and control groups of *S*s were given the same questionnaire. The experimental group showed a significant positive increase in attitudes toward the aged ($p < .01$). The control group scores showed a slightly negative nonsignificant change ($p > .05$). *S*s who reported practicing the scene at home showed a significantly higher increase in scores ($p < .01$) than did the *S*s who did not report additional trials.

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ADDENDA

The experimentation mentioned on p. 197, line 3, above, has been recorded by the author since the above article was written: Cautela, J. R. Covert reinforcement. *Behav. Ther.*, January, 1970.

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STUDENT POWER AND DOGMATISM*

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A. INTRODUCTION

Investigators of the causes of student unrest have examined the role of personality (4, 15), attitudes (1, 6, 12), and demographic characteristics (1, 13). The purpose of this study is to determine the interrelationships of variables presumed to contribute to student activism.

B. METHOD

1. *Subjects*

A total of 455 *S*s participated in this study: 140 upper level high school students from three high schools in Windsor, Ontario, and 315 University of Windsor students.

2. *Material*

a. Demographic Characteristics. Questionnaire data were obtained on level of education, school grades, and sex.

b. Dogmatism Scale. A 20-item short-form of the D Scale (14) developed by Rokeach (8) was used. This scale is purported to measure openness *vs.* closedness of belief systems. It is assumed to be independent of the content or direction of belief, and measures general authoritarianism rather than adherence to left wing or right wing beliefs.

c. Student Power Attitudes. The item content of this 10-item scale is on the desire for greater participation in the decision-making process, including the hiring and firing of teachers; support of student demonstrations; the use of force to correct injustices, and the school as a force for social change.

d. Student Activism. The Occupation of University Building item dealt with a specific incident. The Participation in Student Demonstrations item covered any form of protest at the high school or college level.

e. Attitudes Toward Social and Educational Issues. Sixty-three Likert-type

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[1] The author wishes to express his gratitude to Brian Bigelow, Theresa Sheenan, and the other 11 students in Research Group No. 13 in Social Psychology.

items were developed on such topics as the desire for autonomy, antiauthoritarianism, criticism of education, antiintellectualism, laws on alcohol and drugs, Viet Nam, race riots, etc. Items were suggested by interviews with activists and published accounts of speeches by student protest leaders. The items were pretested on a sample of activists and nonactivists.

3. *Procedure*

In early 1969 a student research group in a Social Psychology class developed a questionnaire on student unrest. Its completion coincided with the occupation of a wing of a university building. Permission was obtained from the occupiers to administer the questionnaire after the termination of the occupation. The questionnaire was also administered to a sample of nonoccupiers.

C. Results

Correlations were computed among the seven variables and the 63 attitude items, and the results were subjected to a principal components method of factor analysis with Jacobi-Kelly successive solutions. The five factors extracted were rotated to orthogonal simple structure using Kaiser's normalized varimax criterion. The three largest factors were interpretable. The rotated factor matrix is shown in Table 1.

Factor I (Antibureaucratic Paternalism) includes Dogmatism (.59), Participation in Student Demonstrations (.56), Occupation of University Building (.43), and Student Power Attitudes (.43). The item with the highest loading is "I do things better when people let me do them my own way" (.60). This factor is defined by the desire for autonomy and a challenge to the legitimacy of adult authority. An antiestablishment attitude is expressed in the two items on the Viet Nam war.

Factor II (Antiintellectualism) includes Level of Education (—.58), School Grades (—.32), and Dogmatism (.31). The item with the highest loading is "Much of what I am required to learn in school is not relevant to the outside world" (.50). This factor is partially defined by attitudes on the value of a formal education. Items with moderate loadings also suggest an acceptance of a Hedonistic Ethic rather than the Protestant Ethic. A fun morality is evident in items calling for greater laxity in regard to sex mores, laws on alcohol and smoking marijuana.

Factor III (Poor Quality of Instruction) includes Dogmatism (.46) and Student Power Attitudes (.40). The item with the highest loading is "Many of my teachers do not show the relation of the subject matter to the real world" (.59). This factor is defined by items on teacher characteristics, teaching style, and classroom atmosphere. Some cynicism is expressed on the value of academic achievement and the integrity of politicians. Factor III is similar to the Quality of Instruction factor identified in a study of college climates (11).

D. DISCUSSION

Student activists have been variously described as dogmatic (9), antidogmatic (1), and dogmatic antidogmatic (9), depending on whether the focus is on the tactics, the objectives, or the discrepancy between the two. Personality test scores of activists suggest they are more flexible (15) and tolerant of ambiguity (13) than nonactivists.

The writer administered a measure of Dogmatism to activists and nonactivists. Some correlates of Dogmatism are authoritarianism (8), resistance to compromise (2), and attitudinal rigidity (7). The results of the present study did not confirm the results obtained with other measures of flexibility-rigidity. The data suggested instead that activists had a greater tendency for Dogmatism than nonactivists.

A simple interpretation of these data is unwarranted. A relatively high correlation was found between Dogmatism and Student Power Attitudes ($r = .61$, $p < .001$). A relatively low correlation, however, was found between Dogmatism and the two measures of Student Activism: Participation in Student Demonstrations ($r = .26$, $p < .001$), and Occupation of University Building ($r = .15$, $p < .05$).

The problem of interpreting these data is apparent from an examination of the factor loadings. Dogmatism loads on all three factors, but the loadings of the attitudinal and behavioral measures of student protests on these factors were dissimilar. Student Power Attitudes had positive loadings on all three factors. Student Activism had a positive loading on Factor I, a negative loading on Factor II, and no loading on Factor III.

A further problem is suggested by research that the D Scale is multidimensional. Kerlinger and Rokeach (5) identified four dimensions: isolation-alienation, self-proselytization, a belief in one great truth, and a belief in one great cause. It is conceivable, therefore, that the correlation between Student Power Attitudes and Dogmatism reflects one dimension, and that Student Activism is related to another dimension. Perhaps, Student Power Attitudes are related to the isolation-alienation dimension. The alienated youth differ from activists in being less committed politically, less intellectually-oriented, and more rejecting of adult values (4).

TABLE 1
Rotated Factor Matrix

Measure	Factor		
	I	II	III
Variable			
Level of Education (H.S. *vs.* college)	05	—58	—16
School Grades (low, average, high)	09	—32	—07
Sex (female *vs.* male)	01	—11	—05
Occupation of University Building	43	—26	01
Participation in Student Demonstrations	56	—17	01
Student Power Attitudes	43	22	40
Dogmatism Scale	59	31	46
Item			
I do things better when people let me do them my own way.	60	—07	13
Schools should not tell students what to wear or how to cut their hair.	60	01	06
Often my time is wasted in school.	58	—07	01
I can't talk openly with my parents about things that really bother me.	55	—04	—10
The United States was wrong in sending troops to Viet Nam.	54	—02	08
Canada should condemn the war in Viet Nam.	54	01	02
I doubt that the best way to deal with people who break the law is to punish them.	49	—06	01
Persons in positions of authority have little concern about my welfare.	45	03	06
Most teachers place too much emphasis on discipline.	43	12	28
Students should have more freedom in choosing courses.	42	05	15
School rules are more for the convenience of the staff than for the good of the students.	42	06	53
Much of what I am required to learn in school is not relevant to the outside world.	—08	50	06
I've had many poor teachers in the past.	14	49	01
Many of the virtues and ideals we are told about in school are false.	09	47	23
The youth of today should have more time to enjoy themselves.	25	47	13
One can learn as much or more by traveling than by going to school.	—04	44	21
Hard work is the key to success.	12	—43	—26
The trend among young adults toward greater freedom with sex should be encouraged.	—01	42	06
Many of my teachers do not show the relation of the subject matter to the real world.	08	—06	59
My class periods are often boring.	14	07	52

TABLE 1 (*continued*)

Measure	Factor I	II	III
Item			
Many teachers are unfair.	18	29	51
Few of my teachers are enthusiastic about what they are teaching.	15	04	50
Many politicians are corrupt.	—02	13	46
It's not what you know, but who you know that helps you get ahead.	—08	20	45
I would rather have fun than be an outstanding student.	—01	33	38
The atmosphere is tense in most of my classes.	20	07	36

Note: Decimal points are omitted.

The Student Activism items could be related to the two D Scale dimensions on beliefs in one great truth and one great cause. Watts and Whittaker (15) observed that activists were flexible, as measured by a personality inventory, and rigid in their dealings with school administrators. This paradox was handled by differentiating between the trait of rigidity as psychologically defined and commitment. This interpretation is supported by Katz (3) who found that activists have in common a willingness to take risks in the pursuit of some ideal of justice. The discrepancy between the dogmatism of activists found by the writer and the flexibility found by Watts and Whittaker, may be resolved if one is willing to assume that the present data reflect a "need for commitment" rather than rigidity.

The paradox of antiintellectual intellectuals (9, 10) has been attributed to student protesters because of the inconsistency between their tactics and their superior grade point-average (12, 13), level of education (9), and intellectual orientation (1, 13). The negative loadings of Level of Education and School Grades on Antiintellectualism in the present study does suggest that such attitudes are more characteristic of high school students than college students, and of students with lower grades than higher grades. But the educational variables do not have any significant loadings on Antibureaucratic Paternalism on which Activism has its major loadings. And the loadings of Activism on Antiintellectualism are low, though in a direction consistent with prior research (1, 13). The writer suggests that antiintellectualism, as defined in this study, may be of limited significance to understanding student activism.

The finding that Activism was related to concern over Antibureaucratic

Paternalism rather than Poor Quality of Instruction is consonant with survey studies (6, 12). These studies suggest that the distinctive factor in activism is the belief that student rights are being denied rather than poor educational quality. Criticism of classroom instruction, however, was found by the author to be related to Student Power Attitudes. The author suggests that in a student confrontation the sympathetic observers and the active participants may have somewhat different perceptions of its causes and objectives.

E. SUMMARY

A factor analysis identified three independent dimensions: Antibureaucratic Paternalism, Antiintellectualism, and Poor Quality of Instruction. Student Activism and Student Power Attitudes were similar in having high loadings on the first factor, but different in their loadings on the other two factors. Dogmatism helped to define all three factors. Dogmatism was highly related to Student Power Attitudes and to a lesser degree to the two measures of Student Activism.

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EFFECT OF REFERENCE MARKS AND LUMINANCE ON DISCRIMINATION OF MOVEMENT*[1]

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A. INTRODUCTION

Graham (8, 10) mentions that in real movement, which in the case of a limiting condition may be comparable to apparent movement, a number of complicated effects may occur involving the movement of a contrast wave. No attempt is made under the present circumstances to analyze correlates of this process, but a study is made of the effect of various stimulus parameters for the purpose of extending further our knowledge of controlling variables whose explication may enhance analysis.

The study of the effect of number of reference marks on rate threshold[2] was undertaken after the results of preliminary experiments on lower velocity thresholds for real movement had emphasized the fact that velocity thresholds are extremely dependent upon the presence of reference marks in the field. In a completely "empty" field, thresholds are very high and, in some cases, movement cannot be discerned.

Aubert (1), Bourdon (3), von Kries (19), and other investigators have pointed out that studies of the perception of motion of a point which is completely isolated have met with many difficulties. Autokinetic movements are frequent and, conversely, points moving at extremely rapid rates may not be observed to be in motion at all. Experiments preliminary to the ones reported here demonstrated both of these phenomena.

Aubert, using various stimuli, such as a ruler with alternate black and white millimeter markings and a vertical black stripe, found the rate threshold to be about one to two minutes of arc per second for the fixated stimulus

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[2] This report is based in part on a dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in the Faculty of Pure Science, Columbia University.

to appear to be moving immediately upon presentation, if stationary parts of the apparatus were easily visible. When the subject viewed the moving stimuli through a slit which excluded stationary comparison objects, the threshold angular velocity increased by a factor of 10, to from 10 to 20 minutes of arc per second. Bourdon found that for an isolated object the threshold rate was 15 to 20 times greater than that for an object viewed in the presence of visible stationary objects.

Grim (13), using circular movement, found that a decrease in intensity was accompanied by an increase in rate threshold.

J. F. Brown (4) has summarized the findings of various other investigators of velocity thresholds up to the time of his own experiments. One of Brown's studies (5) was of the influence of a number of variables on several types of movement threshold. Stimuli were small black squares pasted at equal intervals on an endless white paper band; stimulus movement was in a vertical direction. The lower rate thresholds were found by Brown to correspond to values of two to six minutes of arc per second. Brown (4) also studied rate matches (equality of "phenomenal velocity") when a variable vertically moving series of figures was adjusted so as to appear equivalent in rate to a standard vertically moving series of figures. Several field and stimulus dimension conditions were used.

A study by Leibowitz (15) deals with rate threshold as a function of luminance and exposure duration. A horizontally moving series of figures was employed and threshold rate of movement was obtained at seven luminance levels, from .016 to 500 mL and at five exposure times, from ⅛ to 16 seconds. In general, it was found that lowered luminance or diminished exposure duration increased the rate threshold for movement.

For the luminance study at hand, it would be expected that, for a single moving rectangular stimulus at a single exposure duration, a similar intensity relation would hold: i.e., that rate-of-movement threshold would be highest at low luminance and at higher luminance velocity threshold would be decreased.

In another study, Leibowitz (16) found that a series of grid lines placed over a series of moving figures produced a lower rate threshold than that obtained in the absence of the grid.[3]

In the present investigation, it would seem that movement threshold would probably be a function of number of reference lines; i.e., threshold would probably be lowest when there are many reference fiducial marks available, and when there are few, movement thresholds would be increased.

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[3] This result was noted only above the critical duration of about .1 second, below which the threshold velocity was determined in accord with the Bunsen-Roscoe law—i.e., presumably by the magnitude of initial photochemical events, as was shown by R. H. Brown (6).

B. METHOD

1. *Apparatus*

A description of the apparatus (a hydraulic system) has been published by Graham, Mates, and Shlaer (12) and in greater technical detail by Graham and Shlaer (11). In brief, the overall equipment could present a vertically descending moving stimulus to the subject. The rate of descent could be varied by means of a hydraulic regulating mechanism. Velocity was ascertained by means of a timer operated by two limit switches which were separated by a known distance. The useful range of velocities provided by the apparatus is from about .01 inches/second to 2.0 inches/second.

The stimulus test object for these experiments was a slit cut in black heavyweight construction paper. It was carried on a frame attached to the hydraulic mechanism directly in front of an illuminated opal glass plate. Thus, the subject was presented with a vertically descending moving stimulus (*A* in Figure 1) whose velocity could be varied. Its dimensions corresponded to 6.87 × 17.19 minutes of arc. A stationary fiducial reference mark (*B* in Figure 1), 3.44 × 13.75 minutes in size, was mounted beneath the lowest position of the moving stimulus and could also be presented, if desired. A circular background field (*C* in Figure 1), 13 degrees in diameter, was presented by placing a thin sheet of glass at a 45° angle to the

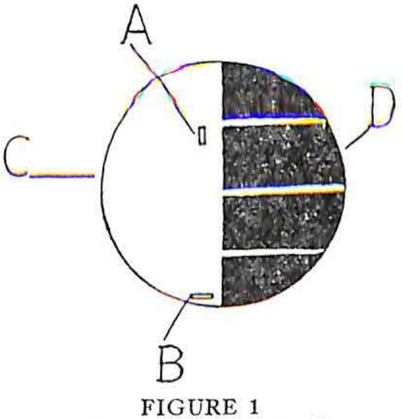

FIGURE 1
SCHEMATIC REPRESENTATION OF THE CIRCULAR FIELD
AS SEEN BY THE OBSERVING EYE OF THE SUBJECT
A: moving stimulus, B: stationary fiducial reference mark, C: circular field outline, D: a stationary reticle pattern.

subject's line of sight. An illuminated circular opal glass surface off to the side was reflected in the glass so as to be coplanar with, or, alternately, much closer than the moving stimulus. This surface provided the background field. The subject was thus able to see the brighter moving target through the glass plate, directly in his line of regard, superimposed upon the dimmer reflected circular background. For the coplanar viewing conditions, both the moving target and the surround were viewed at a distance of 69.25 inches. In the mixed-range situation (14), the moving stimulus was viewed at a distance of 100 inches and the surround at 17.2 inches.

Reference lines (*D* in Figure 1) were provided by superposition on the background light source of heavyweight construction paper into which slits, perpendicular to the straight edge of the paper, had been cut. A sheet of paper without slits was employed to provide a straight edge without reference marks. The illuminated slits were five minutes of arc in width and were separated by intervals of .83, 1.66, and 3.32 degrees. These dimensions corresponded to three, six, and 12 slits for the mixed-range viewing conditions and four, eight, and 15 slits for the coplanar arrangement. The separation between the moving stimulus and the straight edge of each pattern was 27.26 minutes of arc.

The subject saw, then, for the study of the effect of reference marks on rate threshold, a circular surround with a grid of horizontal illuminated slits or a straight edge along its vertical diameter. A small, brighter rectangle appeared within the upper circumference of the surround and descended vertically for six seconds. The luminance of the background was 1.0 foot-lambert and that of the moving target was 15.8 foot-lamberts.

For the investigation of velocity threshold as a function of luminance, the descending target was presented within the circular surround. No reticle pattern or straight edge was used. The single fiducial mark (*B* in Figure 1) was present even when the moving stimulus was not presented. Coplanar viewing conditions prevailed.

Velocity determinations were made at moving stimulus luminances of the following foot-lambert values: .017, .029, .046, .14, .59, 1.86, and 15.85. Corresponding background values were .001, .002, .003, .009, .037, .12, and 1.00 foot-lamberts. Intensities were varied by means of neutral density filters placed between the subject's eye and the total stimulus configuration.

2. *Procedure*

Because of the nature of the hydraulic system, precise setting and resetting of particular stimulus rates was not possible. However, stimulus descent could be varied systematically from an initial rate by turning a needle valve control. Therefore, a modified method of limits (9) was used to obtain ascending and descending lower velocity threshold values. Steps of velocity used were usually in the ratio of not more than 1.06 to 1.00 for ascending series or .94 to 1.00 for descending series. The mean threshold rate of the ascending and descending values was determined in minutes of arc per second.

Catch trials were provided throughout the experiment by turning the needle valve control in a direction opposite to that of the series in progress.

At first, 10 threshold measurements, five ascending alternating with five descending, were taken. As this procedure proved very time-consuming and fatiguing to the subject, the number of measurements was reduced first to six and ultimately to four threshold readings per stimulus at any one sitting. (The values obtained for the appropriate smaller portions of the 10-measurement trials did not deviate greatly from those of the complete series.) It was then possible to obtain measurements for a series of four to six stimuli within a session of not more than about one and one-half hours duration.

The number of threshold determinations contributing to each value reported thus ranges from eight to 30, depending upon the number of sessions and the time of the study for which the subject served.

(*a*) *Number of reference marks.* The subject dark adapted for 10 minutes and then light adapted for 10 minutes to the surround containing the moving stimulus, which was kept stationary during light adaptation. Subjects were instructed to maintain fixation on the edge of the reticle pattern to the right of the point at which the leading edge of the moving stimulus first appeared.

Presentation of the three reticle patterns and the straight edge was in random order for each day's series, which consisted of all four stimuli. Investigation utilizing the coplanar viewing conditions took place after completion of the mixed-range study.

Five subjects, three women and two men, with normal vision, participated. Two subjects had taken part in preliminary studies; two others had served in other psychophysical studies. The experimenter was one of the subjects. Subjects served under the mixed-range viewing conditions in this and a concomitantly run rate threshold study. In addition, the experimenter's and one subject's data were obtained in the two studies under the coplanar viewing conditions.

(*b*) *Luminance.* The subject dark adapted for 15 minutes and light adapted for from one to five minutes, depending upon the luminance used, to the surround containing the reticle slit (*B* in Figure 1) and the moving stimulus, which was held stationary during adaptation. Subjects were instructed to maintain fixation on the edge of the surround to the left of the point at which the leading edge of the moving rectangle first appeared. Five ascending luminance levels were utilized at each session.

Data were obtained from two subjects, one of whom had served in other psychophysical experiments.

C. Results

1. *Number of Reference Marks*

The mean threshold rate of stimulus movement for each subject for each reticle slit pattern and for the straight edge under the mixed-range viewing conditions may be seen in A of Table 1. Table 1, B, presents the data for the two subjects who repeated the experiment under coplanar viewing conditions.

TABLE 1
VELOCITY THRESHOLD AS A FUNCTION OF NUMBER OF SLITS FOR MIXED-RANGE AND COPLANAR VIEWING CONDITIONS
Rate thresholds in minutes of arc per second for each subject for each of three reticle patterns and the straight edge for mixed-range viewing conditions (A) and with equidistant sources (B).

	Number of slits						
Subject	0	3	4	6	8	12	15
			A. Mixed-range viewing				
FSM	7.05	3.68		1.28		.95	
KB	9.01	3.60		2.59		1.67	
BM	7.86	1.70		1.15		.64	
VS	6.12	2.66		1.55		1.23	
DB	9.02	5.81		2.57		1.89	
Mean	7.81	3.49		1.83		1.28	
			B. Coplanar viewing				
FSM	6.57		3.68		1.36		.77
BM	4.25		1.77		.53		.28
Mean	5.41		2.72		.95		.52

For the mixed-range conditions, the mean thresholds of the subjects, for the straight edge, ranged between 6.12 and 9.02 minutes of arc per second. For the pattern with the fewest slits, the threshold values ranged from 1.70 to 5.81 minutes of arc per second. For the medium number of slits, the three lower values ranged between 1.15 and 1.55 minutes per second, the two higher thresholds being similar, 2.59 and 2.57 minutes, respectively. Threshold values for the greatest number of slits ranged from .64 to 1.89 minutes per second, the three lower values ranging between .64 and 1.23 minutes.

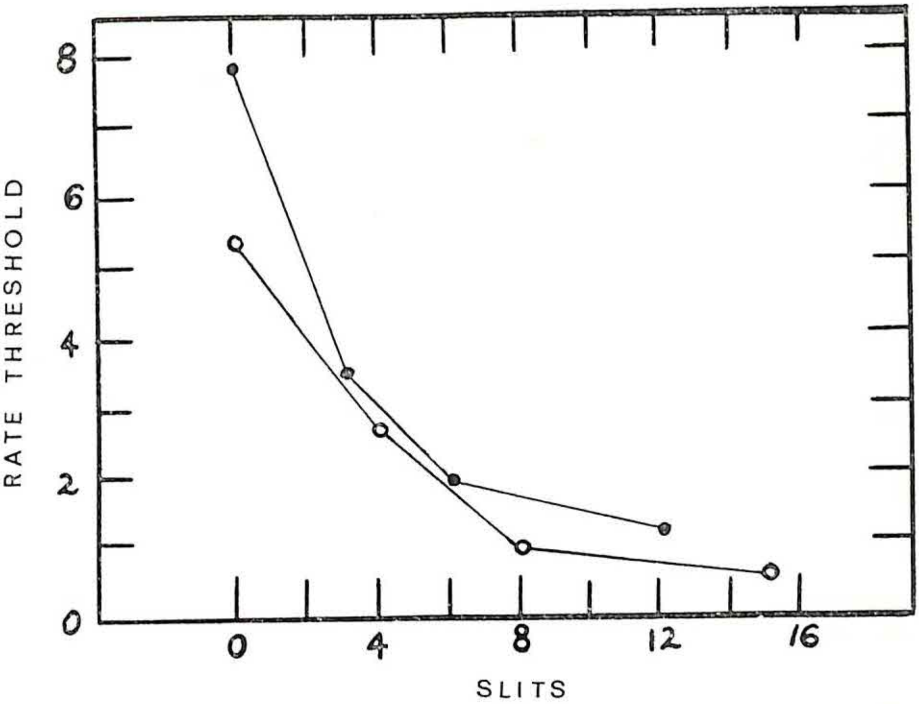

FIGURE 2
THRESHOLD VELOCITY IN MINUTES OF ARC PER SECOND AS A FUNCTION OF NUMBER OF RETICLE SLITS
The upper curve is the mean of subjects' data for the mixed-range viewing conditions; the lower curve is the mean for the coplanar viewing conditions.

For the coplanar viewing conditions, the values are generally similar to those of the mixed-range data for subject FSM, whereas the values for subject BM tend to be lower for the coplanar conditions for 0, 8, and 15 reticle slits. Variability of threshold value tends to decrease with an increase in the number of slits.

Figure 2 presents the mean curves for both viewing situations. The upper curve represents data for mixed-range viewing conditions and the lower curve shows coplanar results. Threshold rate of movement is highest when a straight edge without slits is present. The threshold decreases with an increase in the number of slits of the pattern and is lowest for the greatest number of slits. The slopes of the mean curves may be seen to become flatter as the number of slits increases.

The results of this experiment show that the velocity threshold decreases as the number of reference lines in the field increases.

2. *Luminance*

Table 2 and Figure 3 present the data of the two subjects. The upper curve of Figure 3 shows velocity thresholds of subject NJ; the lower curve, subject CW. The slopes of the curves decrease rapidly at first and then more slowly. The two subjects' mean thresholds range from 8.30 and 10.58 minutes of arc per second, respectively, at the lowest stimulus luminance, to 2.10 and 3.12 minutes per second at the highest intensity. The curves are somewhat similar in shape; the thresholds of one subject were consistently higher than those of the other.

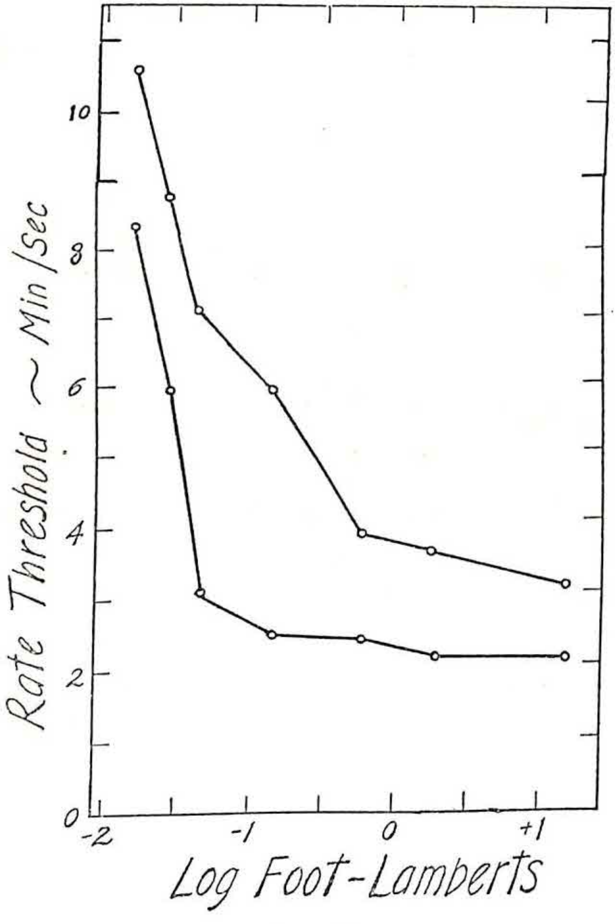

FIGURE 3

Threshold Velocity as a Function of Luminance

Upper curve: subject NJ; lower curve: subject CW.

TABLE 2

VELOCITY THRESHOLD AS A FUNCTION OF LUMINANCE

Rate threshold in minutes of arc per second for each subject for each of seven luminance levels.

Subject	Foot-Lamberts of moving stimulus .017	.029	.046	.144	.589	1.862	15.85
CW	8.30	5.89	3.12	2.46	2.36	2.17	2.10
NJ	10.58	8.77	7.23	5.98	3.80	3.56	3.12

The experimental data show that there is a decrease in velocity threshold with increased stimulus luminance.

D. DISCUSSION

1. *Number of Reference Marks*

Data of this experiment turned out to be in accord with the expectation that an increase in the number of stationary reference marks in the field would result in a decrease in the threshold angular velocity for seeing movement.

With an increase in the number of reference marks in the field the subject is given the opportunity to observe more and more otherwise indiscriminable movement. That is, as the number of reference points increases, there is an increasing possibility for the relative difference in position of the stimulus to be seen at lower rates of movement.

These findings are consistent with findings by Leibowitz (15) and are roughly comparable with some data in a different context by Brown (5). See also Aubert (1, 2) and Bourdon (3) for effects of extraneous stimuli.

The data for the coplanar conditions were obtained after those for the mixed-range conditions had been secured. The similarity of both sets of data indicates that monocular movement parallax factors, which could conceivably have operated under mixed-range conditions, were not responsible for the resulting velocity threshold functions.

Aubert (1) found that a vertical black stripe could be seen in horizontal motion at its upper end, which was adjacent to stationary parts of the apparatus, at close to one minute of arc per second. At that velocity, when the center of the moving stripe was fixated it seemed to be at rest; the rate had to be greatly increased for the center of the stripe to appear moving.

Presumably, then, proximity of the moving object to a stationary line is an important influence in the discriminability of movement; the nearer the position of the moving object to the reference line, the more obviously can the change in position of the moving object be seen in relation to the reference fiducial object. In addition, it would be expected on a probability basis that an increase in the number of reference objects would increase the probability for discriminating changes in position of the moving object. Thus, velocity threshold would decrease as number of stationary reference marks increased.

Increasing the number of reticle slits in the background increases the probability of providing a stationary reference against which to view differential movement. Thus, the probability of seeing movement is increased and the threshold value of the movement is decreased.

2. *Luminance*

Experimental data were consistent with the expectation that as stimulus intensity increased velocity threshold would decrease.

The general shape of the functions (threshold curves negatively accelerated with increasing luminance) is in accord with the findings of Leibowitz in his study of rate thresholds of a moving band of figures.

In the present study, exposure duration was held constant at six seconds; figural luminances ranged from .017 to 15.85 foot-lamberts. The obtained values of the data for the two subjects, ranging from 10.58 to 2.10 minutes of arc per second, are higher than the velocity thresholds for the most comparable conditions of Leibowitz's (15) study; the threshold velocities of his three subjects for stimulus presentation durations of two and 16 seconds, for luminances from .016 to five millilamberts, ranged between 3.00 and .32 minutes of arc per second for the two-second duration and from .39 to .20 minutes per second for the 16-second presentation.

Leibowitz notes that Brown and Conklin (7), using a single circular spot of light subtending 28 minutes of arc at .026 millilambert at various exposure durations, found the threshold value for the longest duration (16 seconds) to be nine minutes of arc per second, approximately 30 times higher than his own data. Rock (18), using a moving grating test object for varying luminances and unlimited exposure time, found velocity thresholds which were similar to those found by Leibowitz. Leibowitz suggests that perhaps the stimulus configuration differences could account for the large threshold disparities. In the present study, with a single stimulus object at the figural luminance most comparable to that of Brown and Conklin (.029 foot-lambert), thresholds were 5.89 and 8.77 minutes for the two subjects. These values are in line with those found by Brown and Conklin with the single test stimulus.

The question of the threshold value differences may be considered in terms of the findings of the present reference mark study. A moving band of figures provides a series of reference marks for the subject to observe in motion relative to the stationary edges of the surrounding field. Moving grating test objects may, similarly, provide a multiplicity of comparison reference points. These may provide analogous situations to those of the present experiment, in which a single moving rectangle of light was observed relative to stationary series of reference lines. From the data of the present experiment the speculation can be made that factors such as size and spacing of repeating pattern test objects would probably influence velocity threshold in a fashion similar to that of the reference line study.

The findings on luminance show that this variable exerts greatest influence on rate threshold at low luminances. Bourdon (3) has discussed the fact that over a medium-to-high range of intensities, the threshold for velocity [probably dependent on slow-movement detectors, the retinal on-units (17)] seemed independent of luminance. Such an interpretation may underestimate the dependence of the discrimination upon the sensory system, mainly because, over the considerable luminance range shown in Figure 3, velocity threshold is nearly independent of luminance. At low intensities, however, threshold is, in fact, strongly dependent on luminance in a manner reminiscent of a reciprocal-acuity *vs.* log luminance function. This emphasis of the effect of luminance stresses the role of the sensory system in velocity discrimination.

The data of this study indicate that the numerous test object variables, such as those investigated in another way by J. F. Brown (4, 5), are most important in influencing velocity thresholds and, furthermore, are amenable to functional analysis and study.

The results of this experiment may be taken to indicate that with increase of luminance in an extremely narrow rectangle of light oriented in the direction of movement, factors related to the increasing effect of the contrast wave in each elementary sensory area result in the stimulus being seen to move across the visual field faster (8).

E. SUMMARY

Lower velocity thresholds were determined for a narrow descending rectangle of light, viewed for six seconds on a large, dimmer, circular background. Horizontal illuminated slits, at three different separation intervals in an otherwise black semicircle of the background field, provided reference marks. A completely dark semicircle with a vertical straight edge was also used. For the luminance experiment the descending rectangle was viewed within a dimmer circular surround with a single small horizontal fiducial

reference mark near the lower background field circumference. Seven luminance values were used.

The results show that threshold velocity decreases as the number of reference lines in the field increases. Velocity threshold also decreases with increased stimulus luminance.

The reference line effect is interpreted to mean that the probability of appropriate comparisons of moving stimuli with reference marks increases as the number of reference lines increases. The luminance effect is discussed in terms of retinal contrast wave factors.[4]

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SALIVATION AS A PHYSIOLOGICAL INDICATOR OF INTROVERSION*

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A. INTRODUCTION

Several studies recently carried out in England have supported the hypothesis (3, 4, 5) that the characteristically greater effector output of introverts is a manifestation of a state of higher cortical facilitation. Corcoran (1) found the salivary output of introverts to be significantly greater than that of extraverts in response to stimulation of the tongue with four drops of pure lemon juice; no significant relationship was produced by citric acid, even though this stimulant effectively promoted salivation. Eysenck and Eysenck (4, 5) found high negative correlations between extraversion and salivation in response to the introduction of lemon juice onto the tongue. The correlation was not significant when a commercial substitute ("Jif") was used in place of lemon juice (5); in addition, there was no correlation of salivation with neuroticism. A tentative interpretation of a reversal of effect produced by having *S*s swallow pure lemon juice (4) was proposed in terms of the earlier appearance of Pavlov's transmarginal inhibition in individuals (introverts) with "weak nervous systems."

These results suggest the possibility of a purely physiological measure of personality. In view of the potential utility of such a measure—for example, in neutralizing the inherent fakeability of most current personality inventories and the high degree of "psychological test sophistication" of North Americans (especially students)—the present study constituted an attempt to extend its absolute and cross-cultural generality.

B. METHOD

1. *Subjects*

Fifteen introverts and 10 extraverts from an Introductory Psychology class were chosen on the basis of their scores on the Eysenck Personality Inventory (2), as summarized in Table 1. Scores ranged from 4 to 8 for the

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introverts and 17 to 20 for the extraverts, while no significant differences in neuroticism were evident; *E* was unaware of the scores achieved until the completion of the study.

TABLE 1
EXTRAVERSION (E) AND NEUROTICISM (N) SCORES ON THE EYSENCK PERSONALITY INVENTORY (E.P.I.)

Subjects		Mean	*SD*
Introverts	E	6.20	1.02
($N = 15$)	N	10.20	4.31
Extraverts	E	18.30	.90
($N = 10$)	N	9.70	3.71

2. *Procedure*

Following an experimental technique devised by Corcoran (1) and modified by Eysenck and Eysenck (3) *S* was instructed to incline his chin a few degrees above the horizontal, open his mouth, and curl up the tip of his tongue slightly so that a small well or pocket was formed on its upper surface. A standard cotton wool dental swab, weighed (in thousandths of a gram) on a Mettler electric balance[1] just prior to testing (Weight 1), was then positioned by means of a pair of tweezers on the sublingual salivary gland of *S*. Immediately following this four drops of fresh, pure lemon juice from a medicine dropper were placed in the well of the tongue; after 20 seconds the swab was removed and immediately reweighed (Weight 2). Since Eysenck and Eysenck (4) had shown that it was unnecessary to establish the salivation rate without any stimulation, the difference Weight 2-Weight 1 represented the amount of salivation in response to stimulation by the lemon juice.

C. RESULTS

The data were straightforward and may be summarized as follows:

1. On the average, introverts salivated .133 gm ($SD = .070$), extraverts salivated .090 gm ($SD = .051$); the difference between means (.043 gm) was significant ($t = 1.732$, $df = 23$, $p < .05$, one-tailed test) and in the same direction as earlier studies.

2. The difference in mean amount of salivation (.009 gm) between men ($N = 10$) and women ($N = 15$) was not significant ($t = .308$, $df = 23$, $p < .01$).

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[1] The cooperation of Dr. W. A. Ayer, Department of Chemistry, University of Alberta, for the loan of a Mettler electric balance, and Dr. R. Stuart for a supply of dental swabs, is gratefully acknowledged.

3. The difference between introverts and extraverts in terms of the distributions of individual amounts of salivation about the median salivation level (.091 gm) was significant ($\chi^2 = 4.20$, $df = 1$, $p < .05$), as shown in Table 2.

TABLE 2
DISTRIBUTION OF *S*s ABOUT MEDIAN LEVEL OF SALIVATION

Subjects	Introverts	Extraverts
Above median level of salivation (.091 gm)	9	2
Below median level of salivation (.091 gm)	6	8

4. The product-moment correlations between salivation, extraversion, and neuroticism are given in Table 3. Correlations were calculated on (*a*) the full data matrix, and (*b*) a reduced data matrix which used only those *S*s having less than the mean neuroticism (N) score (i.e., $N = 11$); the full matrix contained 25 *S*s, the reduced matrix contained 19 *S*s. None of the correlations of salivation with neuroticism, or extraversion with neuroticism, reached significance, while the correlations between salivation and extraversion were significant at $p < .05$ (full data matrix) and $p < .01$ (reduced data matrix) levels respectively.

TABLE 3
PRODUCT-MOMENT CORRELATIONS BETWEEN SALIVATION, EXTRAVERSION, AND NEUROTICISM

Variables	Full data matrix	Reduced data matrix
Salivation-Extraversion	—.34	—.46
Salivation-Neuroticism	—.24	—.14
Extraversion-Neuroticism	—.01	+.15

D. DISCUSSION

In the sense that the data show (*a*) introverted *S*s to have a greater salivary response than extraverted *S*s to stimulation of the tongue with pure lemon juice, and (*b*) this difference to be unrelated to neuroticism or sex, they substantiate previous research. However, while the average amounts of salivation reported by Corcoran (1) and Eysenck and Eysenck (5) were approximately .700 gm and .450 gm respectively, mean salivation recorded in the present experiment was only .115 gm. If this fact is taken together with the markedly lower correlations between salivation and extraversion found in the present study as compared with previous studies—as summarized

TABLE 4
THE RELATIONSHIP BETWEEN SALIVATION AND EXTRAVERSION

Study	Personality measure	Number of subjects	Procedure	Correlation obtained
Corcoran (1)	Heron Scale (6)	(1) 11	(1) 4 drops, 20 secs.	(1) Kendall's *tau* = .62
		(2) 12	(2) 2 drops, 10 secs.	(2) Spearman's *rho* = .70
Eysenck & Eysenck (3)	E.P.I.	93	4 drops, 20 secs.	r_{ES} = —.70 (men) r_{ES} = —.60 (women)
Eysenck & Eysenck (5)	E.P.I.	(1) 100	(1) 4 drops, 20 secs.	(1) r_{ES} = —.73 (men) r_{ES} = —.74 (women)
		(2) 24	(2) 4 drops, 20 secs.	(2) r_{ES} = —.60
		(3a) 27	(3a) 4 drops ("Jif"), 20 secs.	(3a) r_{ES} = —.02
		(3b) 20	(3b) 6 drops ("Jif"), 30 secs.	(3b) r_{ES} = —.12
Howarth & Skinner	E.P.I.	(1) 25	(1) 4 drops, 20 secs.	(1) r_{ES} = —.34
		(2) 19	(2) 4 drops, 20 secs.	(2) r_{ES} = —.46

in Table 4—earlier work is thus seen to be supported in direction but not in degree.

As has been pointed out (5), technique of administration of the salivation test must be rigorously followed, and the possibility exists (since details of technique are somewhat lacking in the literature) that the discovered differences in the amount of salivation between the present study and previous studies may be due merely to procedural inconsistencies. It is the suggestion here, however, that an explanation of the differences could lie to some extent in the nature of the groups tested. Although Corcoran (1) did not specify the source or background of his *S*s, Eysenck and Eysenck (5) used working men and housewives; on the other hand, the present work involved first-year university students. Thus, while the correlations between salivation and neuroticism did not quite reach significance, it is possible that the comparatively lower level of salivation of the students may have been due partially to apprehension about the experimental situation causing a relatively "dry-mouthed" condition (although in this regard, the lower ambient humidity level of the experimental environment in the present study as compared to the generally higher level obtaining in England, where all previously reported work has been carried out, also may have been a relevant variable).

E. Conclusions

While previous research has identified the salivary response to lemon juice as a pure measure of introversion, in the light of the present study such a conclusion must be regarded with caution, and can only be tentatively accepted until a number of further conditions have been satisfied: (*a*) Standardization of, and rigorous adherence to, salivation test administration procedures; (*b*) Parametric manipulation of all aspects of the test—for example, position of the swab in relation to the sublingual and parotid salivary glands, quantity of lemon juice used, site of application to the tongue, elapsed time between application and measurement of salivation; (*c*) Validation and generalization of results across heterogeneous samples; (*d*) Improvement of introversion-extraversion devices to facilitate screening of spurious extraverts (and spurious nonneurotics) from test samples; (*e*) Biochemical investigations to determine the specific constituent(s) of lemon juice responsible for the observed experimental effects.

F. Summary

The increment in salivation in response to four drops of pure lemon juice dropped on the tongue was measured in 15 introverts and 10 extraverts. Al-

though the introverts salivated significantly more than the extraverts (while there was no correlation between salivation and neuroticism), the mean salivation levels of both groups were markedly lower than those previously reported in the literature. On the basis of these results, it was suggested that acceptance of the salivary response to lemon juice as a pure measure of personality may be premature.

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SPATIAL VISUALIZATION IN SOLVING COMPLEX VERBAL PROBLEMS*

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A. INTRODUCTION

Differences in several internal and external factors make individuals vary in their effectiveness in solving complex problems. As internal factors, Gagné includes amount of stored information, retention of concepts or rules, ability in discriminating relevant from irrelevant aspects of the problem situation, fluency and flexibility in forming hypotheses, sustained retention of the solution model and data in face of interferences during the sequence of problem-solving activities, and accuracy in checking the specific solutions which occur against the general solution model so as to accept a correct match and reject incorrect ones. The external factors include the cues in the problem situation, verbal directions, and instructions which guide the learner efficiently through the task (1). With this combination of several internal and external factors, it seems probable that an especially favorable external factor, such as efficient instruction, could compensate for a deficiency in an internal factor, such as sustained retention of the data in the problem while they are being symbolically manipulated.

When complex problems—such as anagrams, syllogisms, time-rate-of-travel-distance, and other object-interaction problems—are presented verbally, solving them often requires holding in mind and manipulating the multiple components of the solutions. Ability in imaginative visualization of spatial patterns should facilitate such solutions.

In support of this hypothesis, Gavurin found a correlation of .54 between scores on the Revised Minnesota Paper Form Board test of spatial manipulations and success in solving six-letter anagrams, for 13 college students who were permitted only mental manipulations of the letters. For 14 other students, equal to the former group in spatial aptitude, who were permitted concrete manipulations of the letters, the correlation between their Form

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[1] Mr. James R. Holder collected the data in this study for his Master's degree thesis, which was suggested and supervised by the senior author.

Board and anagram scores was only —.18 (2). Concrete manipulations of the letters relieved the students of the need for mental manipulations of them, and thus probably eliminated spatial-visualization aptitude as a factor in the task.

In using other types of problems than anagrams, this study extends the test of the hypothesis that aptitude in spatial visualization facilitates mental solutions of symbol-manipulation-type problems. In addition, it tests the further hypothesis that deficiencies in the spatial visualization abilities needed in solving complex verbal problems can be compensated for by instruction in overt, concrete visualization of the multiple data and conditions in such problems. According to this hypothesis, it is expected that instruction will improve the verbal problem solving of individuals relatively low in spatial-visualization aptitude. However, the same instruction is not expected to improve the verbal problem solving of individuals relatively high in spatial-visualization aptitude. Because they are able to represent and manipulate the data in verbal problems symbolically, such individuals probably feel no need for other techniques.

B. METHOD

1. *Subjects*

From a class of 146 freshman and sophomore students in General Psychology, 18 pairs were selected—matched for verbal reasoning ability but in being as disparate as possible in spatial-visualization aptitude. The average difference between the "high" and "low" groups in spatial aptitude was two standard deviations (20.56 in standard T-score units). Both the high and low spatial-aptitude groups were randomly divided for instruction or noninstruction in diagrammatic techniques of visualizing the data and conditions in the verbal problems.

2. *Tests*

The Differential Aptitude Test of Space Relations was used as the measure of spatial visualization. Each of the 40 items requires the mental manipulation of a two-dimensional pattern to select among five alternatives the tridimensional structure it would make when folded on the lines indicated. For matching the pairs on verbal reasoning, the DAT test of Verbal Reasoning was used.

3. *Verbal Problems*

The test of verbal problems, constructed in two equivalent forms of 16 items in each, included three types of problems, all involving the mental representation and manipulation of multiple items of data. Each form included four syllogisms, such as "All hunters are hikers. All hikers are campers. Therefore, (*a*) no campers are hikers, (*b*) all hunters are campers, (*c*) some hikers are not campers, (*d*) some hunters are not campers." Each form included six time-rate-distance problems, such as "A passenger fell asleep after he had traveled half way to his destination. When he awoke there remained half the distance he had traveled while asleep. For what part of the way did he sleep: (*a*) 1/4, (*b*) 1/3, (*c*) 1/6, (*d*) 1/5?" And each form included six logical deduction problems, such as "There are four roads here. I have come from the south and want to go to Jacksonville. The road to the right leads somewhere else. Straight ahead it leads only to a ranch. In which direction is Jacksonville: (*a*) south, (*b*) west, (*c*) east, (*d*) north?"

One form of the test was used as a pretest and the other as a posttest, each occupying 50 minutes. To control for possible differences in difficulties, half the *S*s took Form A as the pretest and Form B as the posttest and the other *S*s reversed this order of forms.

Prior to the posttest, which followed the pretest by one week, the low and high spatial-aptitude instructed groups were given an hour of systematically planned instruction on diagrammatic techniques of representing data and conditions in the three foregoing types of problems. The instructions included (*a*) explanations, (*b*) step-by-step demonstrations, and (*c*) guided practice on examples (nonidentical to those in the pre- and posttests). Venn diagrams were used to represent the syllogisms. Marked lines represented the time-rate-distance problems. Diagrammatic replicas of the facts and conditions were adapted for the logical-deduction problems, such as a symbolic map for the above "four-roads" problem.

4. *Procedure*

To test the hypotheses (*a*) on the relation of spatial-visualization aptitude to an extended domain of verbal problem solving and (*b*) on the possibility of instruction compensating in such problem solving for deficiencies in spatial visualization aptitude, the data were treated in two ways. First, for an N of 97,[2] correlations were found among the test of 1) DAT Space Relations, 2) DAT Verbal Reasoning, and 3) Verbal Problem Solving. Second, mean scores on verbal problem solving were compared for the four subgroups of nine *S*s in each (the subdivided extremes in spatial aptitude of 18 pairs selected from the original N of 146). These groups included low spatial aptitude (*a*) instructed and (*b*) noninstructed groups and high spatial aptitude (*c*) instructed and (*d*) noninstructed groups.

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[2] Of the 146 students who took the DAT tests of Verbal Reasoning and Spatial Reasoning, only 97 took the test of Verbal Problem Solving.

C. Results and Discussion

On the interrelations among the tests of 1) DAT Space Relations, 2) DAT Verbal Reasoning, and 3) Verbal Problem Solving, the correlations are: $r_{12} = .52$, $r_{23} = .63$, and $r_{13} = .56$. Our correlation of .56 between spatial-visualization aptitude and solving verbal problems in an extended domain of multiple-data problems approximates the correlation reported by Gavurin for anagrams (2). Both verbal-reasoning and spatial-visualization aptitudes make substantial contributions to students' effectiveness in solving complex verbal problems. The partial correlation ($r_{13.2}$) of .34 indicates that apart from the abilities which the DAT verbal reasoning and spatial visualization tests measure in common, spatial-visualization aptitude makes an independent contribution to effectiveness in complex verbal problem solving.

The pretest-to-posttest gains in verbal problem solving of the instructed and noninstructed students in the low and high spatial-visualization aptitude groups are presented in Table 1.

TABLE 1
MEAN PRETEST AND POSTTEST SCORES AND GAINS IN VERBAL PROBLEM SOLVING OF INSTRUCTED AND NONINSTRUCTED STUDENTS IN THE LOW AND HIGH SPATIAL-VISUALIZATION GROUPS
($N = 9$ in each group)

Spatial visualization	Instruction	Pretest	Posttest	Gain	Differences in gains	t	p
Low	Given	12.12	14.67	2.55	2.10	2.04	<.50
	Not given	12.22	12.67	.55			
High	Given	15.00	14.89	−.11	.55	.86	ns
	Not given	14.33	13.67	−.66			

Reflecting the correlation of spatial-visualization aptitude with verbal problem solving, Table 1 shows that the pretest mean scores are higher for students with high than with low aptitude in spatial visualization. It also shows that only the group low in spatial-visualization aptitude profited significantly from instruction in diagrammatic representation of the data and conditions in complex verbal problems. Without instruction, neither those low nor high in spatial-visualization aptitude made significant gains in verbal problem solving. However, for the students low in spatial-visualization aptitude, the mean gain in verbal problem solving is 2.10 points higher for the instructed than for the noninstructed group—a difference which is statistically significant (with a one-tailed test) at the .05 level ($t = 2.04$). For the students with high spatial-visualization aptitude, the gains in verbal problem solving of the instructed and noninstructed groups did not differ significantly. Able to represent and manipulate the data and conditions in the verbal problems mentally, the students with high spatial-visualization aptitude did not profit from instruction in the concrete, graphic techniques. Because the instruction produced a slight (statistically insignificant) negative gain for the high spatial aptitude group, the difference in gains in verbal problem solving made by the instructed low and high spatial-visualization groups of 2.66 is statistically significant at the .01 level ($t = 3.06$).

D. SUMMARY

In summary, the data support both hypotheses of the study. Not only for anagrams, but also for other problems which require the representation and manipulation of data and conditions, it was found that successful solutions are related to spatial-visualization aptitude. It was also found that deficiency in spatial-visualization aptitude can be compensated for by instruction in diagrammatic techniques for representing the data and conditions of the problems. To generalize, especially favorable external factors can sometimes compensate for deficient internal factors. The implication for teaching is that more precise analysis and instructional control of the specific factors in a learning task should improve students' performance in it.

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ERROR, ENTROPY, AND THE EVALUATION OF EXPERIMENTS*[1]

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A. INTRODUCTION

The interpretation given to the existence of error in scientific measurements is an important source of ambiguity in science. One's interpretation of error often seems interwoven with one's views concerning the nature of the universe, which are probably determined largely by emotion and speculation. Science operates best when freed of ambiguities and biases, regardless of the level of consciousness at which they operate. It thus appears profitable to examine interpretations of error and its related concepts—probability, chance, determinism—in an attempt at clarification and possible resolution of issues.

B. TWO INTERPRETATIONS OF DETERMINISM

We will delineate what appear to be two contrasting interpretations of error in a deterministic universe. Oversimplifying, we will call them the "classic" and the "anarchic" positions. The classic position was that of the earliest scientists. They emphasized the deterministic nature of the universe and the possibility of discovering the "laws" of the universe through reason and controlled experimentation. Mathematics and classical mechanics became models for stating universal laws. The basic mathematical equation $Y = a + bX$ could describe universal relationships. However, as science progressed and became more complex, a probabilistic model was substituted for the mathematical model. The basic equation became $Y = a + bX + e$, in which the term e represented the recognition of error or inexactitude in scientific data. Quantum mechanics replaced classical mechanics. While classical science grew up in a milieu dominated by a vision of the universe as simple and orderly, there appeared, concomitant with the introduction of statistical mod-

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els, the viewpoint that the universe is the product of haphazard forces acting at random—the anarchic position.

The anarchic viewpoint is supported primarily by two principles derived from empirical findings: the Second Law of Thermodynamics and the Heisenberg Uncertainty Principle. The Second Law, as Norbert Wiener (17, p. 28) has interpreted it, describes "nature's statistical tendency to disorder, the tendency for entropy to increase in isolated systems . . . ." The universe, as a whole, is running down, entropy is increasing; living organisms merely represent small islands of locally increasing order and decreasing entropy, declared Wiener. Physical and cultural evolution ("progress") must end in a downhill path. The existence of life is a "lucky accident" arising out of the random physical activity of a universe in which the "drab uniformity" of entropic equilibrium is the ultimate and predominant condition.

Werner Heisenberg (9) formulated the principle of indeterminacy or uncertainty in physics. Briefly, it states that at the atomic level the measuring instrument alters the parameters of the entity being studied and makes precise simultaneous determination of several parameters impossible. The principle has been widely, and perhaps mistakenly, generalized to include measurements at macroscopic levels.

These two principles buttress the viewpoint that the phenomena studied by science are basically transient, the result of chaotic forces, and ultimately incapable of being known in their totality. The anarchic viewpoint has become dominant among philosophers of science. It has been so persuasively presented by many writers (3, 6, 17) that it needs little elaboration. The idea of order arising out of random events was, of course, given early impetus by the writings of Eddington (5), who stated that an army of monkeys hitting typewriter keys haphazardly might, given sufficient time, type out by "chance" all the books in the British Museum.

The uneasy juxtaposition of the classic and anarchic positions in the thinking and activity of scientists leads to certain paradoxes and confusions. Scientists will not dispute the assumption of determinism without risking the danger of undermining the basic tenets of science. Likewise the assumption of regularity—of repeatability of observed relationships—is widely accepted. Virtually all the accepted findings of science are based on such assumptions, established in the classical era of science. These assumptions are still held, in spite of the gradually-reached conclusions that exact (mathematical) relationships cannot be found because of errors of measurement, and that experimental conditions can never be precisely duplicated. The scientist, and especially the behavioral scientist, has had to learn to live with more or less close approximations to general mathematical laws.

The classic scientists' hope of discovering and understanding all the operations of the universe has given way to grave doubts concerning the orderliness of things and often to an underlying disillusionment and despair in the face of an apparently chaotic universe. As data collection mounts at a staggering rate, scientists are increasingly pessimistic about their ability ultimately to assimilate the myriad research facts that can be collected. This feeling is augmented by the statements of systems theorists, such as Ashby (1), which place limitations upon science's ability to analyze adequately all available research data. Ashby discusses the impossibility of representing all logical outcomes of a complex scientific experiment in a universe which has definite physical limits. No machine, artificial or living, can perform the unlimited amount of data processing necessary to analyze and test completely all possible outcomes of experiments.

A definite conflict arises *vis-à-vis* the question of evolution. Julian Huxley [quoted in (19, p. 117)] has pointed out the paradox that the Second Law of Thermodynamics is in direct conflict with the facts of evolution. Is the universe "winding up" or "running down"? The evolutionary advances of life seem to contradict the statement made by the Second Law that entropy is increasing in the universe. If matter inevitably tends toward a state of equilibrium, there can be no growth or evolution of new forms of order. How could order have ever arisen at all?

We have briefly summarized the positions of what we term the classic and anarchic philosophies of science, and will now illustrate some effects of these philosophic positions upon the thinking and activity of behavioral scientists.

C. EFFECTS UPON RESEARCH ACTIVITY

The testing for statistical "significance" and subsequent acceptance or rejection of experimental results lies at the heart of scientific experimentation. It is the final step in most empirical studies, and the success of the experimenter's efforts depends upon whether the results reach an acceptable level of significance. One anonymous example from the research literature should suffice: "Comparison of the relationship between the two variables was achieved by calculating rank order correlations between these variables for each of the 10 experimental days. All resultant rhos were negative, ranging from —0.06 to —0.68, with a mean correlation of —0.34, which failed to reach statistical significance."

The failure to reach significance is often attributed to a small number of observations, a point which follows from the Law of Large Numbers.[2] In the example given, the authors found all negative relationships, but could not conclude that the two measures were inversely related because of the variability in the magnitude of the separate correlations. With a larger *N*, could a "significant" conclusion have been reached concerning the presence of an inverse relationship? The answer is yes, if further observations had followed the pattern of the first 10. Assuming that the mean correlation remained about —.34, the Law of Large Numbers would allow the conclusion that the relationship was significant.

While this firmly established use of statistics provides a stable basis for evaluating scientific data, it has not been found totally satisfactory and has frequently been criticized (e.g., 12). The criticism most relevant here is the following: any experimental result, even an illogical one, can be shown to be significant provided the *N* on which it is based is sufficiently large. This proposition is widely subscribed to, but especially, it seems, by behavioral scientists of the "tender-minded" variety. It is a direct outgrowth of the anarchist view, expressed in a paradoxical form suggesting that everything and nothing in the universe is lawfully determined. Carried into action, the outcome of this viewpoint is either that research is eschewed altogether or that experiments based on illogical hypotheses are done, in a self-defeating manner.

While tender-minded behavioral scientists probably most frequently express the statement given above, they are not the only critics of statistical methodology. Many hard-headed determinists refuse to accept significant research results, for example in parapsychology, even though proper scientific methods of data collection and analyses were apparently followed. In such cases it is sometimes retorted that these experiments only indicate that our scientific methods are inadequate. Such cases also can provide fuel for the argument that anything can be proven with a large enough *N*. Present statistical methods receive criticism from both sides, but no direct modification or replacement of them is imminent.

D. A POSSIBLE RESOLUTION

We present here a position of resolution, and for expository purposes will label it a "neoclassic" viewpoint. The neoclassic position will include some of the postulates of both the classic and anarchic positions, and will attempt to avoid violating known scientific facts. We suggest that the reiteration of the classic view of determinism in the universe is important for the operation of science, and is in accord with the best of our knowledge about the structure of the universe. The evidence appears to us overwhelming that order exists in the universe. All our scientific advances are hinged upon and support this proposition. That science can make predictions about natural phenomena with great accuracy hardly needs support. Assuming that one accepts the proposition of determinism, what about the uncertainty principle? Our reply is that *the uncertainty principle itself implies complete determinism,* since the effects of the measuring apparatus upon the entity being measured implies that the measuring apparatus has a deterministic effect upon that entity. We believe, then, that the uncertainty principle is irrelevant with respect to the question of determinism, and relates instead to the question of the limitations of data processing. To assess the effects of all measuring apparatus upon the entities they measure would require an extremely complex analysis which may in actuality be impossible, given the limitations of time and space in which science operates. The relevant question here is whether it is *theoretically* possible to do so.

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[2] For a detailed discussion of the rational and empirical laws of large numbers, see Turner (16).

We have noted the conflict between evolutionary theory and the Second Law of Thermodynamics. How can evolution proceed if matter is tending toward equilibrium and order is decaying? A possible resolution of the paradox may lie in a consideration of the cyclic character of natural forces. Anabolism and catabolism are both necessary for cyclic movement and for evolution. Everything living must eventually die; every ordered entity must become disordered or reach a state of equilibrium (nonequilibrium being equated with order or growth), so that these concepts are two sides of the same coin. The anarchic viewpoint has focussed upon the catabolistic aspect of physical forces and given insufficient weight to the processes of anabolism. Perhaps the more significant question is not whether the universe is winding up or running down, but whether evolution is a stationary or nonstationary process. Is it cyclic in form or is it a "one-shot affair"? One recent philosophy receiving wide attention (15) maintains that evolution is proceeding in a single direction and is apparently noncyclic. Wiener (18) asked whether time could run both forward or backward, implying the question just raised—is evolution proceeding in a definite direction so that if one could run time backward like a motion picture film one could observe a running down of the universe. It is quite possible that the anarchists have overgeneralized the Second Law of Thermodynamics. The law may be applicable to low-level breakdown, but inapplicable to higher-level systems.

If one stresses complete determinism, it is necessary to make provision for the lack of the precision the classic scientists expected. Consider then the following arguments: We propose that the universe is strictly orderly, and leave no room for randomness or indeterminacy. Chance or random error is explained by the imperfection of the scientific experiment. Science must study natural entities as if in a vacuum; however, this is really impossible, as the Heisenberg Principle implies. The "chance" variations found in scientific measurements are caused by multiple extraneous forces acting upon the variables being measured. *"Chance" is defined as extreme complexity.* The universe is a delicately tuned system of enormous complexity. Everything in the universe influences everything else, however indirectly; thus "chance" as random activity is ruled out—its apparent effects are really those of multiple forces interacting. By these statements we seek to clarify the definition of chance.

The normal law of error is due to a multiplicity of forces. Evolution, in a given organism, is shaped by all these forces, but the "field" of the universe is always balanced. It is calculated that a single "random" gene change has little effect upon evolution, and gets lost in the long run (2). If evolution is proceeding through the mechanism of random gene changes, it is not doing so at the level of the single gene change, but either at a more macroscopic level or by means of some more involved patterning process. The study of optimization processes (2) may shed more light upon this question. Nature cannot be proceeding on a hit-or-miss basis, or evolution could not have advanced to its present state, for the same reasons that science cannot analyze by traditional statistical methods all research data it can collect—there simply is not adequate time and space in the universe to perform all the necessary operations. As McCulloch, Arbib, and Cowan (13) have put it: "If . . . one has in mind any practical and interesting job for which one would initiate a self-organizing system, he had better program, or solder in, these necessary structures. He who wants a sweetheart in the Spring would not be wise to wait for an amoeba to evolve her—and there is no use starting with a hundred amoebae instead of one" (13, pp. 57-58).

Another argument for the lack-of-randomness hypothesis is the fact that it has not yet been found possible to program a computer or any other machine to perform random operations. Computer programs to produce tables of random numbers, for example, actually yield pseudo-random numbers by a fixed mathematical formula (8). Although the digits they yield have for all practical purposes the characteristics of "random" numbers, the program outputs are limited to perhaps a million digits, following which the identical million digits would be output iteratively in a totally deterministic fashion. While one might avoid the mathematical formula and allow, say, the "random" electron output of a vacuum tube to govern the operations of a digit-producing routine, one is thrown back upon the assumption that the vacuum tube output is indeed random, an assumption we feel is open to question.

The question of where classic determinism ends and "chance" takes over is extremely unclear in present scientific thinking. It appears inconsistent to accept both notions simultaneously, and thus we have attempted to rule out "chance," where chance is defined as lack of determinism. The statements made here possess little novelty, only, hopefully, clarity. Others have grappled with the nature of *e* and given it a functional, more or less deterministic role. For example, Pinneo (14) has considered "noise" in the nervous system and, following Lashley's (11) lead, disputed the idea that such background activity is random and interfering. He gives such activity the role of controlling the fineness and extent of responses. Clark Hull, whose orientation was classic and mathematical in nature, was at the time of his death moving towards granting behavioral oscillation, or fine "random" errors in learning behavior, a clearly deterministic role (10). Had he lived longer, it is conceivable that he would have adopted the view of some more recent workers who have seen fine, apparently random oscillations as "searching" mechanisms that aid in the cybernetic maintenance of a system (e.g., 4, 7). Perhaps it is possible to regard *e,* or apparently haphazard noise in biological systems as a built-in mechanism for adaptation and evolutionary change.

E. Implications For Scientific Research

Do the points discussed here have any relevance to the practical work of the scientific experimenter? We believe so, and will mention some points of contact between our rather metaphysical considerations and the routine of the laboratory worker. First, statistical tests of significance are probably in need of overhaul. We make this statement with trepidation and with no assurance that statistics can soon be radically altered. The abandonment of present statistical tests with no useful replacement is unpleasant to contemplate, since they introduce order into what might otherwise be chaos in the evaluation of scientific data. However, we feel that too many data are being destroyed because of "nonsignificance" and too much time is being wasted by scientists conducting experiments that produce such data. If scientists could agree that *all* the results of their experiments have some meaning—some determining factors—behind them, it might lead to a more productive situation in which scientists would become more concerned about the many variables, some of them extraneous to their original interests, that have affected their observations.

Presently in the behavioral sciences there are too many tendencies to do "safe" experiments that seem certain of yielding "significant" results, regardless of the scientific import of the work. We think it would be desirable for behavioral scientists to delve more deeply into smaller amounts of data and to avoid the tyranny of the law of large numbers. Refinement of experimental technique should be more emphasized. Data should be collected with more care. A viewpoint that recognized total determinism would lead the experimenter to treat his data collection with more respect and probably lead to more productive experiments.

Despite our misgivings about significance tests, it would realistically be desirable to retain them until something superior is devised, but to temper their interpretation with an understanding of their limitations. An avoidance of a rigid attitude toward significance levels would be desirable, substituting instead a greater concern with the care exercised in the design, controls, and methods of data collection, as well as the relevance of the variables to the general problem being studied. "The value of any research can be determined, not from the statistical results, but only by skilled, subjective evaluation of the coherence and reasonableness of the theory, the degree of experimental control employed, the sophistication of the measuring techniques, the scientific or practical importance of the phenomena studied, and so on" (12, pp. 158-159).

F. SUMMARY

Research in behavioral science has been unfavorably influenced by an underlying confusion between two differing viewpoints concerning the nature of the physical world. The "classic" view of science in which the universe is deterministic and the "laws" of nature can be discovered through reason and experimentation contrasts with the more modern ("anarchic") vision of the world as being the product of chance collocations of atoms within a general chaos. The precise predictions of natural science support the former view, while the Second Law of Thermodynamics and the Heisenberg Uncertainty Principle are given in defense of the latter. The nature of error found in scientific measurement demands consistent interpretation. The common belief that any experimental outcome, however illogical, can be proven significant with a sufficiently large *N*, often becomes a basis for discrediting or avoiding empirical research.

An approach toward reconciliation of these conflicting viewpoints was offered: a "neoclassic" view in which all forms of nondeterminism are denied. Recent advances in the study of optimization processes, self-organizing sys-

tems, and computer technology enable a move to pan-determinism to be made. The belief was expressed that such a view could lead to more productive scientific endeavor by creating greater concern for refining experimental technique and avoiding the tyranny of the law of large numbers.

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A SERIES OF INSOLUBLE PROBLEMS FOR STUDYING COGNITIVE STYLE*

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A. INTRODUCTION

An individual's cognitive style may be regarded as the amalgam of the strategies he typically adopts in his attempts to solve cognitive problems. Few attempts have been made to assess style within a true cognitive problem situation. Consideration of the results of an earlier study (2), using a binary guessing game, suggested that in order to emphasize the process rather than the solution, a series of insoluble problems was required. Such a series, from which a style measure might be derived, was produced, consisting of drawings of sticks which had been partially buried in the ground. Pairs of "sticks," differing in angle of inclination to and length above ground, were presented to subjects individually. A subject's task was to say which of the two he thought would be longer, if their full lengths were revealed. A small pilot study suggested that each subject could be given a "conformity" score, indicating the extent to which he or she tended to conform in choice pattern to the general choice of the experimental group. The aim of the present study is to ascertain if the "sticks" pseudo-problems are meaningful to subjects, in that they form a scalable series. Additionally, its aim is to check that a useful measure of a subject's style can be produced.

B. METHOD

1. *Subjects*

A sample of 60 first year general arts and science students attending an introductory course in psychology were randomly assigned to three treatment groups. Treatment group A consisted of 13 females and 11 males, group B of seven females and 10 males, and group C of seven females and 12 males.

2. *Materials*

(*a*) Fourteen line drawings of "sticks" were prepared, drawn in two heights above the ground line, two thicknesses, upright or sloping to left or

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right and with straight or curly edges. Each stick was drawn singly and also in pairs in every possible combination, but in one presentation order only. (*b*) The A-S Reaction study and the Alice Heim, A.H.4 test of general ability.

3. *Procedure*

Subjects in treatment group A were shown the paired drawings, one at a time in a random order. Subjects were asked on each occasion to make a choice for the longer stick. The two tests were also administered to this group. Subjects in treatment group B were asked to arrange the individual drawings of sticks in rank order in terms of total length. Subjects in treatment group C were shown a series of seven standard stick lengths. They were asked to indicate for each stick drawing the number of the standard length, 1 to 7, to which they thought that stick would approximate, when removed from the ground.

C. RESULTS

The results were scaled in all three treatment groups, using Guilford's (1) "composite standard" assumptions. The results indicated that the stimuli were meaningful for the subjects, who scaled the "sticks" primarily on the cue of length above ground and secondly on the cue of thickness. The ordinal scales produced by the three treatments may be seen in Table 1. From these scales, a coefficient of concordance (Kendall's W) was calculated as $W = .772$, which gives a χ^2 of 33.8 with 11 *df*, showing the relationship among the rankings to be significant beyond the .001 level.

TABLE 1
COMPARISON OF RANKS FROM THREE SCALING TREATMENTS

Stimulus or "stick" drawing	Rank given by: Pair comparison (Males)	Pair comparison (Females)	Ranking	Successive categories
A	7	12	4	4
B	12	13	12	14
C	4	3	5	8
D	14	5	9	13
E	2	4	2	2
F	9	7	11	6
G	1	2	1	1
H	8	8	8	7
I	11	9	13	9
J	10	10	14	10
K	3	1	3	3
L	5	6	6	11
M	13	14	10	12
N	6	11	7	5

TABLE 2
CORRELATIONS BETWEEN NONCONFORMITY SCORES, GENERAL ABILITY, AND "DOMINANCE"

Nonconformity of style	A-S Reaction Study	A. H. 4 Test
Females	.28*	—.03
Males	.83**	.14

* Significant beyond the .05 level.
** Significant beyond the .01 level.

In treatment group A, a style score was calculated for each subject, based on those drawings for which the group as a whole, males and females being treated separately, chose one stick rather than the other. Each time a subject chose contrary to the group choice, his nonconformity score was increased by one. Rank order correlations between these "nonconformity scores" and scores from the two tests appear in Table 2.

D. DISCUSSION

The first result of interest is that no matter which scaling treatment is used, consistent results are achieved. The stimulus material represents a series of unidimensional, scalable attributes and in its binary choice form demands real decisions from the subject.

For further research it is the relationship of the nonconformity style score to other individual variables which is of interest. In this connection, the zero correlations found in the present study, between nonconformity and A.H.4 scores, are of interest. They indicate that this style variable is independent from level of ability. The finding that "dominance," as measured by the A-S Reaction Study, is positively related to nonconformity, suggests that further studies of the nature of this style measure should concentrate on finding other noncognitive correlates.

E. SUMMARY

A new set of insoluble problems is introduced. These consist of drawings of pairs of sticks which have been partially buried in the ground. The subject's task is to choose that stick which he imagines would be longer, if the full length of both were revealed. Scaling the sticks drawings by ranking, successive interval and pair comparison treatments produced highly correlated scales and suggests that the material is meaningful to subjects. Scores derived from subjects' responses in the pair comparison situation may also be used to indicate the degree of conformity or nonconformity of the subject in approach to problem solving. This measure of cognitive style was shown to be independent of general ability, but related to personality dominance.

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THE FERMEDA WORKSHOP: A DIFFERENT APPROACH TO BORDER CONFLICTS IN EASTERN AFRICA*

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A. INTRODUCTION

The Fermeda Workshop in August, 1969, was an attempt to determine whether sensitivity training could be employed effectively in an international setting. The Workshop focused upon two difficult border problems and sought to discover whether the use of such methods in detached surroundings could produce positive solutions which might strengthen peace and security in the Horn of Africa. Sensitivity training involves a prolonged series of small-group sessions which are unstructured so far as procedure is concerned and which enable the participants gradually to gain greater insight into themselves and to communicate their feelings and ideas more effectively than is the case in most formal meetings.[2]

The disputes with which the Workshop concerned itself are between Somalia and Kenya and also between Somalia and Ethiopia. One fact in these situations is uncontested: the majority of the inhabitants of the Ogaden which

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[1] Leonard W. Doob is Professor of Psychology; William J. Foltz is Associate Professor of Political Science and Chairman of the Council on African Studies; Robert B. Stevens is Professor of Law. All are at Yale University.

[2] In an enterprise of this kind the list of those to whom we would express gratitude and thanks should be very long. Some, especially those connected with governments, must alas remain nameless as, here at least, must the African participants. But in particular we must thank the Academy for Educational Development, the Honorable W. Averill Harriman, and above all the Concilium on International Studies of Yale University for financial support and encouragement. Edward W. Barrett, in charge of the Academy's International Mediation Study, devoted some of his prodigious energy and enthusiasm to helping us raise funds. Oscar Schachter of UNITAR provided us with moral and institutional support which was absolutely invaluable. E. A. Bayne of the American Universities Field Staff originally directed our attention to the problems of the Horn and provided generous advice and logistical support. Miss Sonya Haddad functioned efficiently and warmly as secretary and house sister during the Workshop. Otherwise we are tempted to heap scorn and abuse on various villains who either prevented the Workshop from taking place sooner or hindered our efforts when they might have been helpful. We forgive them and render thanks to Dame Fortune and our own constitutions for enabling the Wild Idea to be realized.

is part of Ethiopia and of the North Eastern Province which is part of Kenya are ethnically and linguistically Somalis who, being largely nomads, use the land as grazing grounds for their herds of camels and cattle. The conflict between the nomadic tradition and the fixed boundaries based on the colonial tradition have kept that part of Eastern Africa in a state of war or near conflict for almost a generation, and have caused the inevitable economic drain which follows from war and military preparedness.

For over three years, the three of us—as members of the Yale faculty—sought to find English-speaking African scholars from the three countries who would be qualified and interested in participating in such a workshop, to obtain the informal permission of the three African governments for them to attend, and of course to raise the necessary financial support. As participants, we looked for persons with an interest in the problems caused by the disputes and who also had sufficient emotional stability to submit to the vicissitudes of a T-group. We particularly did not want government officials who would be obliged to defend their nation's articulated point of view. Governmental permission was needed because our African colleagues and we did not wish to run the risk of jeopardizing their careers at home. The major foundations in America turned down our requests for funding for reasons which did not always reflect favorably upon their courage or their desire to innovate. One of us has already described our preliminary misery at least up to the spring of 1967 and we can thus spare our readers and ourselves a recataloging of these early misfortunes (1), but some sense of the approach can be gleaned from the fact that we ourselves have constantly referred to the project as the Wild Idea, so unrealistic did the chance of its ever taking place appear to us. Yet whenever we contemplated abandoning it, some friend was persuasive enough to encourage us to carry on.

During 1967, prospects began to look bright. The one government which refused to come to a decision eventually expressed its *nihil obstat,* perhaps because we had received the backing of the United Nations Institute for Training and Research. In 1968, funds began to appear from two American sources and, with UNITAR's help, from a British trust. Two of us revisited Ethiopia, Kenya, and Somalia to reactivate the interest of the African participants and to find substitutes for those who were no longer available. Through UNITAR we obtained the use of a neutral site for the Workshop, a school on the island of Malta; but then, three months before the event was scheduled to be held in the summer of 1968, the leader of one of the three countries withdrew his consent, for reasons associated with his own political career. The funds had to be returned, the invitations to the participants withdrawn. We felt discouraged.

The Wild Idea, however, seemed too good to drop, perhaps because any attempt to develop new techniques to lessen international tensions would have implications far beyond these particular disputes. In 1969 we adopted a strategy which involved one final attempt to bring off the Workshop, at the shortest possible notice. On June 21 one of us again visited the country whose leader had caused us to cancel the Malta meeting, and this time obtained from him an enthusiastic "green light" (his expression). Both here, and in the other two capitals, the weary task of rounding up potential participants for the Workshop was made all the more difficult by the previous cancellation. A half dozen "intellectuals" in each country, nevertheless, agreed to attend; in Kenya and Ethiopia they all have appointments in the national universities; in Somalia (whose university is only beginning to be developed) they are academically trained persons holding government, educational, or professional positions. None of them officially represented his government.

When we had acquired the 18 best participants available, other staggering administrative problems remained. The Workshop had to be held during the first two weeks of August, since that was the only period when all of the participants could be detached from their institutions, but it was not easy to produce four skillful, experienced, adventurous T-group trainers at such short notice. We were most fortunate, therefore, finally to obtain the services of William J. Crockett,[3] Charles K. Ferguson,[4] Richard E. Walton,[5] and Thomas A. Wickes.[6] These men were intrigued enough by the challenge to reorganize their busy schedules at the shortest possible notice and join in a project which at that stage they had heard described only over the telephone by persons they had never met. Finally, we discovered that Malta and most of the sites we had been considering were not available in the midst of the tourist season. Other sites were politically unacceptable to some of the participants. Eventually we located a comfortable ski hotel (named the Fermeda) three-quarters of the way up a mountain in the South Tyrol of northern Italy. There, in the midst of woods and mountain streams and against a backdrop of the Dolomites, we met from August 2 to August 14, 1969.

B. Method

The entire group consisted of 26 persons: the 18 Africans, the four trainers, a secretary who concentrated upon the numerous housekeeping details of the enterprise, and the three of us. Most of us assembled at the airport in Rome and then immediately established a common bond by journeying together on a bus for 12 hours to Fermeda. At the hotel, each African, with two exceptions, had a room of his own. Seating at meals was optional so that individuals from at least two of the African nations almost always sat down together; the Americans generally scattered themselves at different tables among the participants.

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[3] Saga Administrative Division.

[4] University of California at Los Angeles.

[5] Harvard Business School.

[6] T.R.W. Inc.

The participants had been told beforehand that the first part of the exercise would be unrelated to the border disputes, but instead would concentrate upon training them in the development of communication skills. The trainers, therefore, were in charge and for the first five days consulted with the three of us very little concerning procedural matters; we, in fact, readily agreed to be not merely observers but also participants in the training. After the first session which was attended by everybody—thereafter a session of the entire group became known as the General Assembly—most of the interaction and the exercises were carried on in two T-groups. These groups were initially selected in such a way that they contained three participants from each of the three countries whose professional interests were more or less balanced; two of us, the lawyer and the psychologist, were in one group, and the third, the political scientist, was in the other. These T-groups, therefore, were formed to increase the possibility of building cross-national ties and overall interest.

Some of the exercises, especially at the outset, could have occurred elsewhere in any kind of sensitivity training workshop. Participants complained about the deliberately unstructured character of the early meetings; they yearned for a chairman, parliamentary procedure, and agenda. They often became furious, however, when any of the American or, later on, African participants made a procedural proposal. Some of the aggression against the trainers, us, and one another was fierce. Conflict occurred between individuals belonging to the same or different nations. Mostly, however, the participants wanted the training to begin when, in fact, they were right in the midst of it.

Sessions usually ended by self-evalution of what the group had accomplished, although resistance to this was never entirely broken. Games in small groups were played in more or less traditional T-group fashion. The initial lecture established the distinction between content (what you say) and process (what you really mean, what your motivations are) ; a later one outlined the factors which make for group cohesion.

This preliminary training, however, differed markedly from the ordinary sensitivity training in a number of significant respects. First, the participants did not come, as it were, from a single organization. Across nations they were in effect complete strangers, although a few had heard of some of the others. Within a country they belonged to the same university, or in the case of the

Somalis from the same rather tightly-knit educated community, but few of them were in the same clique. A member of a law faculty, for example, may have known an engineer, but he might well not have participated with him in university or social affairs. Then again the aim of the training was not individual therapy, nor improvement of relations within a particular group, but a more nebulous goal: possible solutions for these border disputes.

Overshadowing the training, at almost all times, was the knowledge that despite the idyllic surroundings, we had assembled to discuss these serious disputes. Some of the participants voiced complaints against us or asserted they would reveal nothing personal about themselves because, they claimed, we were delaying the progress of the Workshop; "get on with the show," they said, "come to grips with the problem at hand"; but others sought to learn as much as they could about sensitivity training because they believed such knowledge would help them professionally at home. The trainers understood this dilemma and handled it excellently. Time and again, they provided the appropriate training. Thus, one of the most successful games, we think, involved competition between small groups in waging war or disarming (The Disarmament Game). Topics, such as the nature of conflict, the Organization of African Unity, and university-student disturbances were discussed in the early T-groups because their processes seemed to relate to the border disputes.

From our standpoint, however, we were in a somewhat strange predicament. As participants, although participating to differing degrees, we experienced some of the *Sturm und Drang* of any workshop. Then the real participants, the Africans, kept reminding us that we were not ordinary participants, for we had organized the enterprise, we held the purse strings, and at least one of us was looked up to somewhat as a father figure with all the ambivalence the role entails. In addition, we were observers interested in eliciting information about attitudes and values in a manner ordinarily not accessible to conventional research techniques; and our African friends, looking upon us as three Americans, kept observing our reactions to personal stress and their political problems. We tried to avoid injecting our own conceptualizations of political problems into the discussion, although we achieved that goal with differing degrees of success.

Toward the end of the first week, the trainers and we decided to shift gradually from sensitivity training to the substantive issues of the border disputes. We had planned a break of two days—most of the Africans and the Americans went to Venice which offered as sharp a contrast to Fermeda as anyone could imagine—and so before then we encouraged the participants, in the language of the trainers, to "ventilate" and to a lesser degree to "diagnose" the border disputes. This they did, or tried to do, by working in national groups with the instruction to list their own grievances against the other country or countries and to anticipate what their opponents' grievances would be.

After Venice, we all concentrated upon the border disputes, more often than not in the two T-groups. Possible solutions were first listed after small-group "brainstorming sessions." Overall plans were drawn up in the T-groups, with the intention of being presented ultimately to the General Assembly. Each day's or session's program was then no longer proposed by the trainers or by them in conjunction with us, but by a Planning Group composed of two persons from each country but from different T-groups, two trainers, and one of us.

C. RESULTS AND DISCUSSION

1. *Expectations and Behavior*

As social scientists will, we approached the Workshop with partially-defined expectations about the way the Workshop would proceed and about possible outcomes. Our expectations were based on our own previous research, assertions made in the established literature, and our individual or joint "feel" of the situation.

Perhaps our firmest expectation was that nationality would provide the most salient principle of association, trust, and like-mindedness among the African participants. We further expected that this principle would become less salient as the Workshop proceeded, and indeed encouraged the trainers in their plan to design things so as to "lace these people together a half-dozen different ways," and thereby encourage association on other bases. These expectations proved more nearly false than true. After the first day, in which fairly standard, although eager, "get-acquainted" procedures were evident, observable informal groups of both a substantive and recreational nature almost always included more than one nationality. Since all three national groups, with varying ease, could communicate among themselves in an indigenous language incomprehensible to nonnationals, and furthermore might be expected to enjoy the relaxation and distinctiveness such communication would afford, the multinational character of the groups was particularly noteworthy. In addition to whatever links the intangibles of interpersonal sympathies might have created, we observed international links were created on the bases of both political ideology and attitude toward the training experience. The most obvious ideological links were forged across national boundaries as a result of intellectual or emotional proclivities for some radical solution as opposed to more incremental change. In addition, at least one person from each national group was consistently interested in the Workshop technique for its own sake and strongly supportive of its technical operation, and at least one was for much of the time reserved or hostile. Like ideology, these orientations carried over to create cross-cutting linkages which persisted within and outside the formal sessions.

Indeed our strongest surprise came toward the end of the first week when for the first time participants were asked formally to caucus in national groups to accomplish a substantive task jointly with their fellow countrymen. Reluctance was widespread, affecting to some degree members of all three national groups, and two of the three groups insisted on redefining the task in a less sensitive direction once they had finally agreed to meet. Several factors, including perhaps the way the task was presented (some participants clearly resented the authoritarian nature of the directive to produce complaints) and of course the effects of the preceding "lacing" may have contributed to the reluctance. In individual conversations with us, however, participants suggested that a lack of complete trust in their fellow countrymen was a motivating factor in at least two of the national groups. When dealing with sensitive issues, many of the participants preferred to associate with persons with whom they could reasonably expect to have only exceptional contact once the Workshop ended, even though such persons involved might objectively be classed as enemies on the issue in question.

The avoidance of one's own national group was most evident in the case of the Kenyans, perhaps because of the high level of political tensions in Kenya following Mboya's then recent assassination, perhaps because of their background which inclined them to behave in a less cohesive manner under most circumstances, or perhaps simply because of traits idiosyncratic to that particular group. This, too, caught us by surprise, since on the basis of the existing literature we had expected intragroup trust to be clearly lowest among the Ethiopians. As expected, the Somalis' individualism permitted them to work together easily and openly.

Rather than decreasing in strength, however, nationality became more salient at the end than at the beginning of the Workshop. Two factors appeared to be at work here. First, as the discussion focused increasingly on the substantive issue and as easy compromise solutions proved inadequate, national positions became more solid and more salient in determining overall patterns of interaction. Second, something of a "re-entry" phenomenon occurred during the last two days when several individuals retreated from previously established conciliatory positions in a manner to suggest either, consciously or unconsciously, that they were preparing a safe record of suitably nationalistic statements with which to protect themselves from attack once they had returned home or, possibly, as they realized that they were about to resume their normal lives, they were reminded of the importance of nationalistic symbols.

Other expectations related to mechanisms through which the African participants might build interpersonal solidarity among themselves or avoid direct confrontation with the substantive issues dividing them. One such mechanism likely to be particularly useful in a stressful context in which non-Africans were exercising at least limited authority would be the building of solidarity on the basis of antiwhite sentiments. Contrary to our expectations, at no point was such sentiment mobilized. Other participants greeted the only such attempt with embarrassment and hostility. A few individuals, particularly in the early days, did make punishing remarks about whites generally, but these were made in passing and were not picked up by the group. Specific condemnations of acts or policies of specific groups of whites were frequent, but were usually not misplaced nor did they betray any latent purpose.

A second expected mechanism, evident in many formal inter-African meetings particularly of major political leaders, was the avoidance of conflictual substance in favor of utopian appeals to eventual political unity of all Africa. This was much in evidence. In each of the two T-groups, and even more so in the General Assembly, participants would attempt to avoid or soften points of stress by emphasizing that all would be worked out "in the framework of the unity which we all seek." Alternatively, the positions were phrased in terms of some blind adherence to a slogan of "federation now." The mechanism served two distinct purposes: to avoid current concrete problems whose discussion might lead to disharmony within the group, and, perhaps more subtly, to soften conflictual assertions by reassuring one's opponent that opposition was only temporary and that nothing personal was implied, since the speaker would be happy to share citizenship with his opponent and all his relatives.

One further (and unexpected) mechanism of cross-national solidarity was a willingness to criticize one's own government. This openness created solidarity by putting many participants in a similar stance and so removing the speaker from direct responsibility for any of his nation's hurtful actions toward other participants' fellow citizens. As with the attitudes toward African unity, we cannot assess the sincerity or depth of these feelings by those who expressed them—much less their legitimacy—nor can we draw any conclusions about connections between overt statements, internalized attitudes, and any concrete action which might be taken on the basis of these attitudes. At this point we merely note the functions they performed in the Workshop context.

2. *Formal Workshop Group Processes and Problems*

Each of the two matched T-groups which became the basic working units of the Workshop developed strong group loyalties and pride at moving faster and more productively than the other. Occasional visitors from the other group were treated as interlopers. In classic style, the T-groups began in confusion, proceeded to frustration, and on the third day suddenly coalesced to conduct an impressive and profitable discussion without benefit of formal leadership or agenda. Succeeding sessions were even better, though both groups eventually returned to some semblance of the initial frustration during the first sessions in which the border dispute was discussed directly. After that, one T-group made notably greater progress than the other: brainstorming sessions were more serious and productive; the disputes were examined more carefully and with less avoidance behavior; the solutions proposed were more specific; and the group stood more solidly behind its own recommendations. The difference is most simply, and perhaps sufficiently, explained by the presence in the laggard group of an individual whose aggressive, uncontrolled behavior, often exacerbated by drink, seemed most probably to be idiosyncratically, not culturally, determined. That group never developed a means of reducing or neutralizing his erratic and sometimes calculatedly disruptive behavior, which seemed to manifest itself most when some progress or agreement was close to hand.

The more effective T-group contained two persons who never became constructively involved, but their deviance took the form of nonparticipation. One of these men was a last-minute recruit and was possibly inadequately briefed about what to expect. He attended sessions regularly, but passively, and was made obviously uncomfortable by any attempts to bring him into discussions. Such attempts eventually ceased. The second of these misfits arrived five days late and then spent more time sleeping and playing cards with guests at the inn than participating in the Workshop. His occasional contributions, while valuable in content, had limited impact because of his failure to participate in the early sessions. Although at times distressing to the organizers, and some of the Africans, the silent deviants in that T-group proved nondisruptive, and the group learned to function effectively without their contributions.

In contrast to the T-groups' general success was the weakness of the General Assembly. Only rarely were these larger discussions productive. Avoidance behavior, intransigence, and various forms of posturing and undercutting, which had earlier been overcome in the T-groups, reappeared in the General Assembly. One procedural sign of difficulty was the General Assembly's stifling reliance on formal parliamentary procedure which reasserted its grip despite repeated and seemingly unanimous efforts to follow freer styles of discussion. Somehow the pompous parliamentary atmosphere—analogous to that which many of the participants derided in their own national parliaments—became so compelling that even the organizers found themselves rising deferentially before Mr. Chairman to a point of order, personal privilege, or the like.

Rather than a cause of the General Assembly's difficulties, the exacerbated parliamentarism seems more a reaction to them, a largely ineffective way to cope with real procedural problems. Among the problems, again, was the disruptive figure mentioned earlier, who in the General Assembly had new and broader fields to disrupt. Certainly his presence in the General Assembly was a major reason why most of the members of the more productive T-group sought to avoid plenary sessions. Also, of course, conducting a chairmanless nondirected meeting of 21 people is more difficult than conducting one with ten persons. The trainers felt, in retrospect, that a different design which would have placed more emphasis on sensitivity training in the plenary session, rather than the T-groups, could have overcome the difficulty. While this cannot be proved by our experience, this view is given some credence by the remarkable similarity of speech patterns in the final General Assembly sessions to those present in the T-groups a week earlier before the effect of training had been felt. Even so, the creation of effective communication and interpersonal trust in the larger group might well have required more time than the Workshop allowed.

The Workshop, in sum, confirmed the old dictum that the expression of attitude depends in part upon the situation at hand. Again and again, we witnessed instances of the same person inconsistently expressing, for example, conciliatory views in his T-group and then being silent or defending a more rigid position in the General Assembly. National groups caucused without Americans present, but our informal reports suggest that this context also influenced expression, as well as content. Perhaps the T-groups succeeded too well and thereby prevented the participants from transferring their emotional attachments either to the General Assembly or the national groups.

3. *Attitudes and Opinions*

We have obtained some sense of the attitudes and opinions of the participants on the two disputes in question from the documents which the nationals of each country composed in response to the request to list their grievances and to anticipate the grievances of their opponents, as well as from our observations of views expressed in the T-groups, the General Assembly, and informal conversations.

One point is clearer than all the rest: the Somalis were well acquainted beforehand with the arguments and values of the Kenyans and Ethiopians, and vice versa. For example, the Somalis anticipated that the Ethiopians would claim that "Ethiopia is a heterogeneous state and cannot admit ethnic separatist movements"; while the Ethiopians in fact noted a "failure to appreciate the far-reaching consequences of redrawing African boundary lines (*a*) through the advancement of linguistic and ethnic ties as a basis of nationhood, and (*b*) through the rejection of existing borders." At the same time some of the issues were probably more salient than others, or else the participants may have been reluctant to express them. Thus, the Somalis, in their written document, did not perceive that the Kenyans might describe Somalia as "being looked at by Russia as a stepping-stone to Eastern Africa and therefore being substantially armed."

The three of us also submitted a document to the General Assembly in which we tried to anticipate, on the basis of our knowledge of the countries, the grievances which each side would express. One noteworthy fact about our lists was that virtually every item was independently mentioned by the participants. This we take to be further evidence of the common knowledge concerning the border disputes which educated and informed persons, whether Africans or non-Africans, share. In addition we, unlike the Africans, did not hesitate to describe the stereotypes frequently held by the nationals of each of these countries about the inhabitants of the other two. Significantly, there was no disagreement with our characterization.

Both in the documents and in the discussions there were few disputes over facts. Obviously, there could be no argument about the role of the European powers in dividing and governing the Horn in accordance with the treaties they had enforced upon themselves and the African peoples there. That the majority of the persons in the disputed areas are Somalis, ethnically and linguistically, was not subject to debate. More surprising, however, was assent to facts which in other international conflicts are likely to produce charges and countercharges, such as the offensive quality of the propaganda broadcast from the Somali radio stations or the brutal treatment of some Somalis by the Ethiopian and Kenyan army and police. The facts could be accepted, but then the evaluation differed markedly.

The most critical difference in evaluation involved the issues of self-determination and sovereignty. The Somalis never retreated from their view that "the inhabitants of these areas [have the right] to determine their own fate," nor the Kenyans and the Ethiopians from their position that each of them is a nation defined, in the words of the former, as "a people [having] a defined territorial border [and] a recognized political structure [with] legal authority, internationally recognized political boundaries, [and] territorial integrity." These were the most intensely held attitudes and, almost always whenever affect was expressed, the clash was between the two irreconciliable positions.

The Workshop and informal conversations could not probe more deeply to uncover the reasons for the strength of these values. If we asked a Somali why he felt so strongly about the people of the Ogaden, he would either consider the question slightly insane or else he would mention relatives of his who reside there or shrines and waterholes needed by his people. The Kenyans and the Ethiopians were likewise surprised when asked why it mattered whether or not the territories were retained: they could supply economic reasons, they could mention treaty rights, they could stress the possibility of other ethnic groups also wanting to leave their multiracial states, but most of all they expressed incredulity that anyone would even wonder why a government would be unwilling to relinquish its sovereign rights. "What is in it for us?" the Kenyans and Ethiopians asked again and again when confronted with proposals that buffer zones be created within or outside the disputed areas. In a sense the overriding symbol which had reality for these men was land: land for grazing, land belonging to the tribe or the nation, tangible land. Although they may have used the fashionable jargon of the times, especially the phrase "national identity," they really attached deep emotional significance to the concepts and extrapolated very easily from personal or tribal concepts of land and property to attribute such concepts to the modern African state.

All of us experienced the intensity of feeling which was expressed especially toward the end of the Workshop. But cracks also appeared in the national armor. Anecdotes were slipped in which had a less absolutistic tone; it is such a nuisance, one man remarked, to have to stop driving when the national flag is being raised or lowered. It may be, some of the participants said, that we have to sacrifice some of our sovereignty to attain peace; or perhaps some of the history is not relevant to the present problem; or we must also consider the circumstances under which plebiscites or other forms of self-determination should be encouraged.

A set of values which did not change was the willingness to criticize one's own government. One man in a T-group stated that he would be critical at home but not abroad, yet he was soon joined by the other participants in pointing out the abuses to which he and others are subjected. Sometimes it was even suggested that the governments had a vested interest in continuing the border disputes in order to distract people's attention from domestic problems; at other times it was stated openly that no solution for the disputes could possibly be achieved under the present regimes. It is doubtful whether such views would be expressed if the participants had been questioned directly, for we had sought out men whose opinions might be listened to by government. We now know that the government connections do exist but that any group of intellectuals in these countries is likely to express attitudes some of which are critical of the *status quo* without, however, being unpatriotic or disloyal. One participant in fact arose and accused the others of "betraying" their countries because in his view they were making no greater progress toward solving the disputes than the governments whose views they were criticizing. Obviously, each side learned something about this critical stance inside the other countries.

We hold the tentative opinion, therefore, that no fundamental changes were wrought directly by the Workshop, but that new political, economic, and social facts may well have been learned. The participants certainly had the opportunity to discover that their antagonists, with the exception of very few, were men of good will who subscribed to opposing viewpoints with an intensity and conviction as strong as their own. It is this insight which may possibly have repercussions and produce change—eventually.

4. *Proposing Solutions*

Even more central to the Workshop's purpose than changing participants' attitudes was the joint exploration and prescription of solutions for the border disputes. Each of the T-groups argued through and eventually proposed a detailed solution to the disputes, and each of the two proposals received the general assent of the members of the T-group responsible. The emotional and intellectual involvement of T-group members with their joint product was strikingly intense; even the disruptive individual subscribed to his group's proposals. At this short remove from the event it is yet impossible to know how much of that involvement represented calculated appreciation of the worth of one's labors, how much represented pride in and support for one's T-group, and how much just the exhilaration of having finally gotten something down on paper. Although national-interest bargaining was sharp within the T-groups, support for the proposals as they finally emerged was apparently genuinely international.

Subsequent publications will deal with the substance of these and other proposals, but here it is worth mentioning the main similarities and differences. One group, largely at the insistence of one of its strongest and most useful members (a non-Somali), began with the affirmation of the right to self-determination of the peoples in the area under dispute, though this was somewhat attenuated by the affirmation that "it is a right to be exercised only under specified circumstances." The other group had repeatedly reached an impasse on the self-determination issue (it was seen as a subtle Somali device for dismembering Ethiopia and Kenya), and had carefully avoided any statement of general principles of the sort. Both proposals provided for some form of joint administration of the "disputed areas" for an interim period, with the question of sovereignty over the areas held, nonprejudicially, in abeyance. Various alternate definitions of the "disputed areas" and of the means and time for terminating the neutralization arrangements were advanced. Each proposal insisted on demilitarization of the disputed areas, with law and order being made the responsibility of a local police independent of direct control by any of the three nations. Both proposals foresaw some role for an expanded East African Community or other formal political arrangements among the three parties as part of a permanent solution.

Under extreme time pressure, the joint Planning Group, which in the second week had taken over the planning of the sessions, amalgamated the two proposals into one for presentation on the last day to the General Assembly. This shotgun wedding of what had been the products of subtly different group processes did not, alas, produce a well-integrated child. One example of the difficulties of the compromise was the reappearance of a *deus ex machina* role for political unity of the three nations as the sole way of effecting a permanent solution for the border dispute. In retrospect, it is easy to see that the amalgamation of the two documents was a major tactical mistake. When the combined document was presented to the General Assembly, it seemed to satisfy no one, and the whole group reached a frustrating and infuriating stalemate. The principal reasons included disappointment at seeing one's original ideas, product of so much arduous thought and negotiation in the T-group, modified or omitted in the compromise document: "What I see here is that my group's document has been adulterated!" The re-entry phenomenon also played its part: "As time goes by here, I am becoming more reluctant to agree that part of our country should be given up." The difficulty of communication in the General Assembly was very much in evidence. The disrupter was his usual unhelpful self—he reversed his usual revolutionary and anti-European stance to quote, approvingly, Churchill in favor of absolute defense of territorial integrity of one's possessions—but even had he been absent in these final meetings the other problems would have remained.

The sticking point was reached over the definition of the areas to be neutralized in the interim period, particularly over whether or not the Somali Republic would have to include some of its own territory in the "neutralized zone." On the one hand, Somalis could claim with perfect accuracy that there was no dispute over any territory now part of the Somali Republic and that it would be senseless to introduce dispute where none existed. On the other hand, Kenyans and Ethiopians could claim perfectly reasonably that all parties to the dispute would have to give up something in any reasonable compromise and that the Somalis just seemed to be looking for something for nothing. "What is it that the Somalis really want?" one participant kept repeating. The various elaborate proposals for resolving or avoiding the issue which had been worked out in the T-groups were rejected in the General Assembly. Yet if some of the national stereotypes were again conjured up, even at the most heated moments, it was clear that national lines did not hold entirely firm. T-group loyalty, ideological proclivity, and new-found intellectual conviction cut across national boundaries to produce smaller groupings of like-minded men on specific issues.

The Fermeda Workshop, thus, did not end with a final communique proposing a single peace formula and signed happily by all, but it did produce general agreement on a two-stage approach involving neutralization of disputed areas during the initial period. This approach was embodied in two detailed proposals, not widely different one from the other, with each commanding the assent of some influential citizens of all three countries involved in the dispute. As we all knew from the outset, the important steps would have to be taken by the politicians of the three countries. We are now in a position to investigate whether these incremental gains of the Workshop are communicated effectively back to the men whose actions could make a difference.

D. Summary

The reader must share some of our ambivalence about the Fermeda Workshop—and possibly some of our exhilaration and some of our frustrations.

One success cannot be questioned except by those who did not have to endure our travail: the Workshop took place, all the African participants arrived, the governments voiced no objection, competent trainers were obtained, and we were able to keep our promise of providing a permissive atmosphere in which any view could be expressed. We had no authority, and until the very end no funds to compel these people to gamble their time and come to Fermeda. Private initiative through university connections was sufficient. In addition, the participants certainly became acquainted with one another and in many instances, we surmise, formed strong friendships across national lines. They expressed to themselves and to us the basic grievances of the countries regarding the border disputes and in this manner revealed their attitudes and values.

From a research point of view, we believe the technique revealed attitudes and complex cognitive processes not obtainable through more standard questioning techniques; but the Workshop inevitably involved only a small sample of persons, and data have been derived in a form that makes coding extremely difficult. The lack of a control group was unavoidable. Finally, the fact that the sample's composition is sure to be known to the governments concerned poses confidentiality problems of a very high order. Against such difficulties in using the technique as a research tool, one clear-cut advantage stands out, particularly when dealing with a group like ours. In contrast to the usual relation between researcher and subject—which is increasingly resented in the developing nations as a subtle form of "academic imperialism"—no information was available to us which was not equally available to the African participants and, should they so choose, to their governments as well. More so than anything we may write, it will be through the African participants' public and private communications that the Fermeda Workshop will have its greatest impact.

On the other hand, the main objective of the Workshop, at least on the surface, was certainly not achieved. No original solution to the disputes was evolved which won the instant acclaim of all the participants. Therefore for the moment we remain skeptical whether the two schemes evolved by the T-groups will be diffused to one or more of the governments and so serve as the basis for any form of agreement among the nations of the Horn.

We equally have no way of knowing definitely whether the successes and the failures of the Workshop, whatever they were, can be attributed to the use of sensitivity training and the various techniques which our valued trainers employed. As we have already noted, there was no control group—and perforce there could be none—to ascertain whether the mere congregating of three groups of sincere African scholars atop a Tyrolean mountain would have produced the same, better, or worse results, if they had begun discussing the substantive issues immediately without the delay which such training entailed. Lectures and games were infrequently referred to in subsequent sessions, but this does not mean that a residue therefrom had no affect upon the men's behavior.

We venture the opinion, the guess, the clinical judgment that the training did contribute appreciably to the breaking-down of reserve and to the enhancing of communication between participants from different nations. It is possible that, in the absence of the disrupter and of the tension resulting from the assassination of Tom Mboya, the more laggard of the T-groups and the General Assembly itself might have made greater progress. We cannot, we repeat, prove these statements of faith, we can only express confidence in them. On the other hand, the genial atmosphere created by the scenery around Fermeda, by the drinking, by the card-playing, and perhaps by the T-groups may have encouraged the participants to be polite to one another, and in this way to avoid rather than face head-on the complicated issues. Our presence—scholars from the West with white skins—may have been inhibiting, although several participants told us they appreciated non-African auspices.

In the future, if the Fermeda technique is to prove useful in other conflicts, we would hazard the opinion that the participants must make a firmer commitment than we were able to procure to support and carry through with the procedural requirements a workshop imposes. No hard sell should be applied by enthusiastic organizers. Participants must want to come, and must want to get the dispute settled badly enough to sacrifice some personal dignity and to make substantive concessions. Were we to do this again, we are uncertain whether we should insist on a stiffer or milder dose of initial sensitivity training despite any objections the participants might raise. We might also favor a more authoritarian regimen for the entire enterprise, including the right to eject participants.

Aside from the obvious point that, as of this writing, the dispute has not been solved even to the satisfaction of three groups of influential intellectuals, other limitations on the future use of the technique must be spelled out. First, such a workshop is not an inexpensive undertaking. The Fermeda costs ran about $40,000, not including many hidden expenses including salaries and overheads absorbed by Yale over an extended period. Secondly, a workshop is very time-consuming, and it is difficult to find men of the caliber required who can give up a particular two weeks of their lives. The time involved for the organizers, before, during, and after the workshop, at least equals that spent on any major research effort. Should the organizers be so foolish as to start such a venture from scratch and take on the responsibility of arousing interest on the part of participants, governments, and foundations, they may find the effort involved disproportionate to any conceivable results.

But against all these points, one must restate the obvious: the travail, the time, and the expense are all of little importance, if a Fermeda-type workshop contributes even marginally to the settlement of a major international dispute.

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FACTORIAL ANALYSIS OF SEMANTIC STRUCTURES IN HUTTERITE ADULTS*[1]

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A. INTRODUCTION

In two previous studies of the social role perception among Hutterite children and adolescents, Schludermann and Schludermann (5, 6) obtained semantic structures which were undifferentiated and unidimensional. It was suggested (5, 6) that the failure to obtain developmental differentiation in the social role perception of Hutterite adolescents was very likely due to the powerful social influences that shaped the growing personality of the young ones. It was assumed that if the assumption were true, then one might expect to find similarly undifferentiated perception of social roles among Hutterite adults. The present study was undertaken to ascertain whether the initial assumption that there are a few basic dimensions underlying Hutterite adults' perception of social roles in their communal society could be maintained. If the initial assumption could be maintained in the adult group, then one might infer that the powerful social factors exert sufficiently strong delaying influences on the cognitive and perceptual differentiation of social roles. If, however, the initial assumption were not supported, one might be led to conclude that the influence of social variables is more likely to inhibit rather than retard the development of cognitive and perceptual differentiation of roles.

B. METHOD

1. *Subjects*

Ninety-three adults (21 years and above) were drawn from 20 Hutterite colonies of Manitoba. All adult male *S*s were occupied in various colony jobs: e.g., farming, dairy, poultry, etc. The female *S*s were engaged in the routines of household and child care: cooking, cleaning, sewing, etc.—that is, the type of jobs traditionally described as female responsibilities. Educationally, the adults had not gone beyond public school grade VIII. There were 55 adult female *S*s and 38 adult male *S*s.

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2. *The Instrument, Concepts, and Scales*

The semantic differential scales and concepts were kept the same as in the previously reported studies (5, 6), therefore, they are not repeated here.

3. *Investigative Procedure*

The adult *S*s were contacted individually in their work locations and in or outside of their homes. The purpose of the investigation was briefly mentioned to them and if the individuals consented to cooperate, they were handed a booklet containing the semantic scales and concepts, as well as a pencil. The *S*s rated the concepts on a five-point scale.

C. RESULTS

Correlation matrices of 15 × 15 scales were calculated separately for the males and females. Factor analyses were done by the principal components method. An eigen-value of 1.0 was used as the cut-off point for retaining factors. Orthogonal rotations of factor matrices were done by the Varimax criterion. Four factors were retained which accounted for 32.21, 9.88, 8.64, and 6.67 percent of variance in the male sample. The four factors accounted for 57.40 percent of the total variance. In the female sample, three factors accounted for 30.00, 11.04, and 8.12 percent of variance. The three factors thus retained accounted for 49.16 percent of the total variance. Even though only the first factor in each matrix can be described as common factors, a closer examination of the factor loadings on the rest of the factors showed these factors to be better differentiated than in the previous two studies (5, 6). A criterion point of ±.40 factor loading was used to select those scales which best described the obtained factors. Table 1 presents the Varimax factor matrix. Factor loadings below ±.40 are omitted from the table. In order to ascertain the similarity and differences between corresponding factors of the two samples, coefficients of similarity were calculated using Wrigley and Neuhaus' formula (for details, see 1, pp. 257-258). The intergroup similarity or dissimilarity was obtained thereby. Coefficients of similarity were also calculated to obtain withingroup interfactor similarities and/or differences. Coefficients close to zero would indicate dissimilarity, whereas a high positive or negative coefficient would indicate a high degree of similarity between factors thus compared.

D. DISCUSSION

1. *Factor Structure (Males)*

Factor I was composed of the following scales in descending order of factor loadings: friendly, pleasant, bright, brave, interesting, gentle, clean, and fast. Factor description corresponded to the evaluative dimension of Osgood *et al.*'s studies (2, 3), and therefore was labelled the Evaluative (E) factor.

Factor II contained the following four scales in descending order: large, strong, fast, and brave. Thus the factor corresponded in general to the potency dimension (3) and, therefore, was labelled the Potency (P) factor.

TABLE 1
ROTATED FACTOR MATRIX[b]

	F_I Evaluative		F_{II} Potency		F_{III} Activity		F_{IV} Toughness
Variables[a]	M	F	M	F	M	F	M
1.			—70	—69			
2.		48			54		
3.	42		—56	—63			
4.	60	64					
5.	63		—42	—69			
6.		55			56		
7.	68			—73			
8.		56			65		
9.	70			—68			
10.		61					87
11.	73	63					
12.	59	77					53
13.	48	42		—41	43		
14.					76	74	
15.			—74			61	

[a] Variables: 1. weak-strong; 2. important-common; 3. slow-fast; 4. interesting-boring; 5. afraid-brave; 6. busy-lazy; 7. dull-bright; 8. useful-useless; 9. sad-pleasant; 10. soft-hard; 11. unfriendly-friendly; 12. gentle-rough; 13. dirty-clean; 14. active-quiet; 15. small-large.

[b] Decimal points and values less than ±.40 factor loadings are omitted.

Factor III was best described by the five scales in descending order: active, useful, busy, important, and clean. As is clear, this is the activity dimension (3) and was called the Activity (A) factor.

Factor IV consisted of two scales, hard and rough. The former scale appeared with much higher loadings than the latter. The factor description corresponded to the toughness character of the potency dimension (3) and, accordingly, was called the Toughness (T) factor.

2. *Factor Structure (Females)*

Factor I could be described by the following scales in descending order: gentle, interesting, friendly, soft, useful, busy, important, and clean. It was called the Evaluative (E) factor because of its similarity to the evaluative dimension (3).

Factor II was composed of the following scales: bright, brave, strong, pleasant, fast, and clean. The factor, as such, was labelled the Potency (P) factor, since it resembled the potency dimension (3).

Factor III consisted of two scales, active and large, and closely resembled the activity dimension (3). It was called the Activity (A) factor.

3. *Factorial Congruence*

As can be seen from Table 2, the withingroup interfactor similarities are low, whereas the between-group intrafactor similarities are high. Moreover, because of several overlapping scales which show high loadings on more than one factor between groups, the interfactor similarities in such cases also tend to be high. As an example, in Table 1, the scales interesting, friendly, gentle, and clean (with high loadings) are common between the E factor of the females, as well as the E factor of the males. Similarly, the scales important, busy, useful, and clean are common between the E factor of the females and the A factor of the males. These common scales, therefore, increase the coefficients of similarity (i.e., .64) between the female E factor and the male A factor, and thereby make the two factors highly similar. Another instance of common scales between factors can be seen between the female P factor and the male E factor; the common scales are fast, brave, bright, pleasant, and clean. The coefficient of similarity between these two factors is, therefore, —.86. There is also a high degree of similarity between the female A factor and the male P factor (i.e., —.69). Thus there is not only a high degree of similarity between the corresponding factors of the two groups, but in some cases, between two noncorresponding factors as well. Since the withingroup coefficients of similarity between factors are low, orthogonality of factors can be maintained within each factor matrix. The high degrees of similarity, not only between corresponding factors, but also between some noncorresponding factors of the two factor matrices, raises the question as to why they are similar. In order to understand the similarities between noncorresponding factors, it is necessary to examine carefully the meaning of the Hutterite semantic structures as they are presented in the tables. The following section attempts to discuss this aspect.

4. *Modes of Social Perception*

Osgood *et al.* (3) suggested that the scales which were chiefly evaluative in nature indicated what might be called "modes" of evaluation. In previous studies (4, 5), the authors suggested that the common factors may be regarded as common "modes" of social perception. Further, the greater the number of common factors used by a group of respondents to describe social roles, the greater would be the cognitive differentiation involved. In two of the studies involving Hutterite children and adolescents (5, 6), no cognitive differentiations were observed. However, in the present study, three to four well-defined factors emerged, even though all the factors could not be called common factors. A close inspection of these factors reveals the connotative meaning of the scales in so far as they show high loadings on certain factor/factors and not on others. The factor matrices, therefore, provide the reader with what may be called the connotative semantic structure of the adult Hutterite respondents. To this extent, the connotative modes of social perception of the Hutterite adults can be described:

TABLE 2
HUTTERITE ADULT SEMANTIC STRUCTURE BETWEEN AND WITHINGROUP FACTORIAL SIMILARITY

		FACTORS						
		F_I		F_{II}		F_{III}		F_{IV}
		M	F	M	F	M	F	M
Factors		(E)*	(E)	(P)	(P)	(A)	(A)	(T)
F_I	M(E)		.78	—.45	—.86	.49	—.01	.07
	F(E)			—.16	—.41	.64	—.17	.45
F_{II}	M(P)				.70	—.35	—.67	.09
	F(P)					—.52	—.27	.10
F_{III}	M(A)						.55	.00
	F(A)							—.20
F_{IV}	M(T)							

* E, P, A, and T within parentheses indicate factors Evaluative, Potency, Activity, and Toughness.

The female E factor can be appropriately described as the "meek-goodness" factor which can be contrasted with the male E factor which may be described as "potent-goodness." The patterns of the scales which constitute the E factors in the male and female samples are somewhat different. There is greater emphasis on some scales in one sample, and on other scales in the second sample. It appears as if the Hutterite females tend to evaluate social roles more in terms of the qualities and characteristics which are of the "gentle" and "meek" type than the males who tend to evaluate roles more in terms of their relative potency in goodness: i.e., "potent-goodness." In so far as the female E factor's connotative meaning includes a certain degree of usefulness, business, and importance, this aspect of the connotative space is shared in common with the male A factor. Therefore, the latter factor can be appropriately described as the "useful-activity" factor and is to that extent somewhat different from the female A factor which emphasizes only activity and size variables. A third interesting fact may be noted. The female P factor, while highly similar to the male P factor, includes scales like fast, brave, bright, pleasant, and clean in its semantic space, and therefore connotatively shares some of the meaning comprised by the male E factor ("potent-goodness"). It appears then that the semantic space of the female P factor includes overtones of meaning over and above that described by pure potency variables. Therefore, the female P factor is appropriately described as "sociable-potency" to differentiate it from the male P factor appropriately described as "male-potency." A comparison of the P factors between samples depicts the different modes of perceiving social roles; i.e., the females predominantly tend to look at the role of power position in a social setting, while the males tend to perceive chiefly in terms of what is traditionally associated with male-role potency. The presence of a T factor in the male sample further tends to emphasize the basically "toughness" aspect (soft-hard as pivot variable) of what is essentially a potency dimension. The high degree of similarity observed between noncorresponding factors of the two samples then may be due to the fact that the connotative meanings of one or more semantic dimensions tend to overlap with that of other semantic dimensions. In so far as there are commonly shared connotative meanings between two or more semantic dimensions, the semantic space between them tends to overlap, and the coefficients of similarity increase as indicators of such commonly shared semantic meanings.

It appears then that the semantic structures of Hutterite males and females, while sharing common semantic meanings, also tend to vary because of considerable overlap between semantic dimensional space. Thus, the male semantic space is not identical with that of the female, but the former has connotative overtones of meaning which are different from the latter, and vice-versa. The differences between male and female semantic structures can, to some extent, be attributed to their roles in society as men and women. The differences between masculine and feminine roles in Hutterite society are well-marked and clearly differentiated through occupation, dress, and types of responsibilities allotted to the two sexes. It can be expected, therefore, that the basically masculine and feminine orientation to social and occupational roles are quite entrenched early in Hutterite life. Influences of social expectation can also be traced in the way Hutterite males and females tend to perceive social roles; e.g., females predominantly evaluate as "meek-goodness" or "sociable-potency," whereas males perceive in terms of "potent-goodness," "male-potency," or "useful-activity." The investigation was undertaken to determine the nature and number of basic dimensions underlying Hutterite adults' perception of social roles. The results indicate that such an assumption can be maintained among the adults but not among the Hutterite children and adolescents. Therefore, one may further conclude that the effect of powerful social influences retards the development of perceptual and cognitive differentiation of social roles among children and adolescents.

E. SUMMARY

Ninety-three Hutterite adults were asked to describe 15 social roles on 15 semantic scales. The 15 × 15 correlation matrices between scales were factor analyzed for the males and females separately. The coefficients of similarity were calculated between groups and within groups to establish inter- and intrafactor similarities. Three factors emerged in the female factor structure, and four factors appeared in the male factor structure. The factor structures were used to describe semantic structures and connotative variations of semantic space between the males and females. Since the assumption could be maintained that there were a few basic dimensions underlying adult Hutterites' perception of social roles, it was, therefore, concluded that the failure to obtain similar dimensions among children and adolescents was due to the delaying effects of the powerful social influences on the development of cognitive differentiation among the young respondents.

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